



Gemmology Today

November 2017
Quarterly Publication



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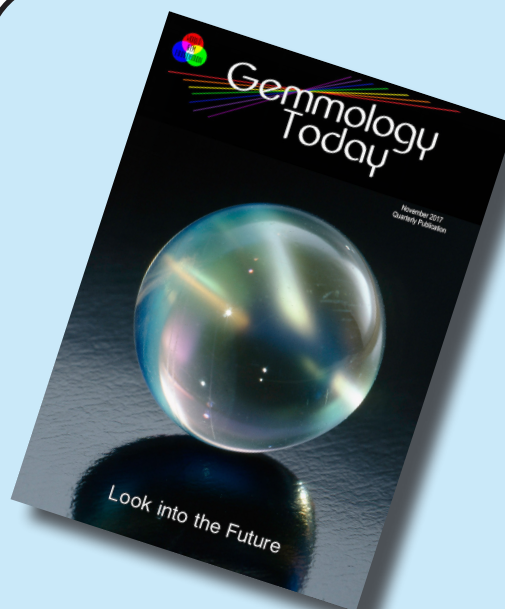
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‘Sometimes it’s the journey that teaches you a lot about your destination’

WORLD GEM FOUNDATION

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Cover Photograph by Tino Hammid

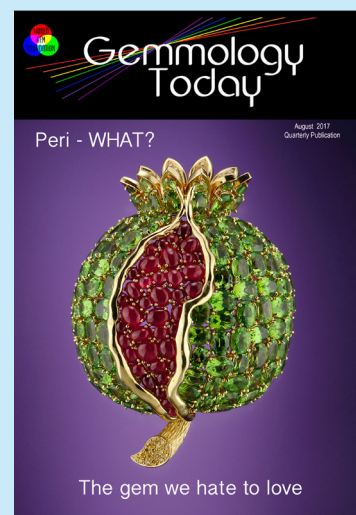
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August 2017 Issue



Geoffrey M. Dominy is the author and creator of the digital e-book 'The Handbook of Gemmology', founder of the World Gem Foundation and editor of Gemmology Today.



World Gem Foundation Founder
Geoffrey M. Dominy

The title for this issue comes from one of my favourite songs by Journey, a super group that was formed by two of the core members of my other favourite band Santana.

The photograph by the legendary Tino Hammid of the Rainbow Labradorite sphere and the title seemed to fit together like a 'hand in a glove' and with all the wonderful things that are happening at the World Gem Foundation and our affiliated gem academies, it certainly seems appropriate. The 'future' at the World Gem Foundation is looking very bright indeed.

In the next twelve months we will see the opening of our new teaching centre here in Palma, Mallorca, Spain, the opening of three new academies in China, South-east Asia and France/Switzerland, the translation of all of our courses into Spanish, the facility to offer our practical workshops in South America, North America and Asia, exciting new programs that allow students to specialise in either Diamonds or Coloured Gemstones, a new general interest course on Rubies, Sapphires and Emeralds and through our centre here in Mallorca the opportunity for students to learn gem cutting, gem, inclusion and jewellery photography and the theoretical study of jewellery appraising.

Next year will also see two important conferences in Kisa, Sweden (Scandinavian Gem Symposium) organized by the Scandinavian Gem Academy and here in Mallorca (Mallorca GemQuest II) organized by the Spanish Gem Academy. These conferences will not only give delegates the opportunity to meet and listen to the 'movers and shakers' in our industry but also the opportunity to attend practical workshops, which seem to be a popular aspect of all conferences nowadays.

As promised, the first four issues of Gemmology Today are available in print and can be ordered through Leone at the Dutch Gem Academy. Please note that we are not offering individual issues, simply a set of four. This offer will be available every year and will cover the November, February, May and August issues just in time for Christmas.

I would also like to thank all of our contributors and especially our readers who have made the first year a stunning success. With over 20,000 readers and digital access in over 50 countries, we are certainly reaching far and wide and hopefully making gemmology not only more accessible but also a little less intimidating.



Medieval Diamond Myths and Misconceptions

Many of the myths and misconceptions relating to diamonds in medieval Europe are rooted in ancient times. Some myths originated due to misidentification of other minerals as diamonds resulting in their properties wrongly being attributed to diamond. Other myths were probably deliberately created for marketing purposes as well as to prevent theft. Myths on origin may have originated as deliberate misinformation on the location of the mines, to add to the diamonds allure and mystique as well as scaring people off from visiting the diamond producing areas or at least sending them in the wrong direction. Other myths were pure fiction, invented by authors of popular novels that became so widely circulated that they are now regarded as facts in our popular culture.

Pliny the Elder mentions the magnetic power of diamond in Book XX of *Historia Naturalis* while giving examples on sympathia and antipathia: 'the magnetic stone draws iron to itself while another kind of stone repels it; the diamond, the rare delight of wealth, unbreakable and invincible by all other force, is broken by goat's blood' (Pliny 2016). Diamonds and blood are mentioned as examples of opposing forces, along with fire and water, with the belief that only by covering a diamond with fresh warm goat's blood could a diamond be broken. This is an allegory later picked up by medieval theologians and incorporated in the Christian religion. Even the most pure and noble (the diamond) could be conquered by the lusts of the flesh (the blood). 'The pure diamond' has been used as a description of Christ (Maillard 1982 p 18).

That this belief in diamond's magnetic power lived on for approximately 1500 years can be exemplified by François Rabelais' 16th century novel 'Gargantua and Pantagruel' where a door is locked by a complicated mechanism using steel plates and magnets. The only way to open the door was to remove the large diamond because it affected the magnetic nature of the iron.

A reason for the belief in diamond's magnetic powers may be explained by the Indian text *Arthashastra* written probably during the 4 BCE where different qualities of diamonds were associated with different casts within the Hindu religion. The highest casts were associated with white diamonds while the warrior cast, for example was connected to red diamonds

and the lowest casts to dark gray diamonds. In all likelihood, the red 'diamonds' were probably rubies or some other red stone while the dark gray stones may very well have been magnetite, a highly magnetic mineral that is often found in octahedral shapes similar to diamonds. One reason to believe that the red and gray diamonds were not really diamonds is how the different colours were valued; a diamond was considered more valuable the lighter it was. With a specific gravity of 3.52, this would make sense if the red diamonds were actually rubies (S.G. 4.00) and the gray diamonds were magnetite (S.G. 5.2) (Maillard p 18-22).

Finally, after two millennia of beliefs that diamonds could influence magnetic properties, William Gilbert, physician to Queen Elizabeth I in England, put 75 diamonds around a lodestone and noted that it's magnetic properties were not affected. Gilbert also dispelled the belief that magnets would lose their power if they were put in goat's blood (Davies 1984, p 9).

There are several myths on diamonds being poisonous, a belief that might have been deliberately spread to prevent theft by mineworkers. Garcia de Orta, a Portuguese stationed in Goa, India saw slaves working with diamonds occasionally swallow them. He noted that the diamonds had no physical effect on the workers and therefore realised that the common belief that diamonds were poisonous was simply not true. Of course if splinters of diamond were swallowed they could have caused internal harm. This was something Benvenuto Cellini, author of *Treatises on Goldsmithing and Sculpture* 1568, knew as well as his enemy who tried to poison him with crushed diamonds. Luckily for Benvenuto the supplier of the diamond had switched the stone to quartz (Harlow 1998 p 127-129).

Frederick II, Holy Roman Emperor and King of Sicily in the 13th century, was less lucky. Legend states he died from a fatal dose of powdered diamond, a destiny shared with the Turkish Sultan Bajazet who was supposedly killed by his son who put powdered diamonds into his food. It is suggested that Catherine de Medici's famous 'poudre de succession' consisted of powdered diamond mixed with some other poison (Bruton 1978 p 9-10).

Other medieval myths and misconceptions can be found in the writings of Sir John Mandeville and his 'Voyages and Travels of Sir John Mandeville' published in the 1360s. In the book there is an interesting description on how diamonds grow. According to Mandeville, diamonds occur as male and female and therefore can have children. The diamond children are small but will eventually grow larger when watered with dew. To make a diamond grow, Mandeville tells us to simply put it by another rock and water it with May dew. From a sellers point of view Mandeville gives several good arguments to buy diamonds as they can help you to be victorious over your enemies, strengthen your bones, and turn back witchcraft. Diamonds also sweat when they are near poison, all very useful properties for the nobles of Europe at the time (Mandeville 2017).

Today it is believed that the name 'Mandeville' is a pseudonym for an unknown author, although several known writers have been suggested as the probable author behind the name. In the 17th century Sir Thomas Browne declared Mandeville 'The Greatest Liar of All Time' and while it is obvious his works were fiction, in medieval times, they were still quite influential. Mandeville borrowed from several known writers such as Marco Polo as well as from religious texts where many stones and other materials had been mistakenly translated into diamond (Harlow 1998 p 128). Mandeville influenced Jerome Cardan, who lived in the 16th century, and in his definition of precious stones he explains that diamonds and other gemstones are distilled from gold and are living beings that are born, grow old and eventually die (Bruton 1978 p 9).

Another myth that seems to have been created in the 14th century is that diamonds can be melted by a thunderbolt. This information is first found in an anonymous Italian text and can be looked upon as a logical consequence of the earlier beliefs that if diamonds were created by thunder and lightning, lightning must have the power to also destroy them (Kunz p 70-71). The beliefs in diamonds connection to thunder and lightning might well originate from the use of the Sanskrit word 'Vajra' meaning both 'thunderbolt' and 'diamond' (Asplund 2016).

Diamonds well-documented properties of fluorescence and phosphorescence, known in Roman times and possibly even earlier (Bruton 1978 p 10) may also have prompted the belief that diamonds held magical powers. Certainly one can imagine the reaction of those witnessing the luminescent effects of a diamond and its changing colours in a darkened room and how this 'news' could easily have spread throughout medieval Europe.

Even though most of the myths and misconceptions during medieval times have been disproven, there are still many misconceptions regarding diamonds that circulate online and in publications with varying scientific profiling. Most of the misconceptions today relate to the historical aspects of diamonds particularly how the Sanskrit word 'vajra', the Hebrew word 'jahalom' and the Greek and Latin words 'adamo or adamas' have been translated and used in religious texts throughout the two last millennia.

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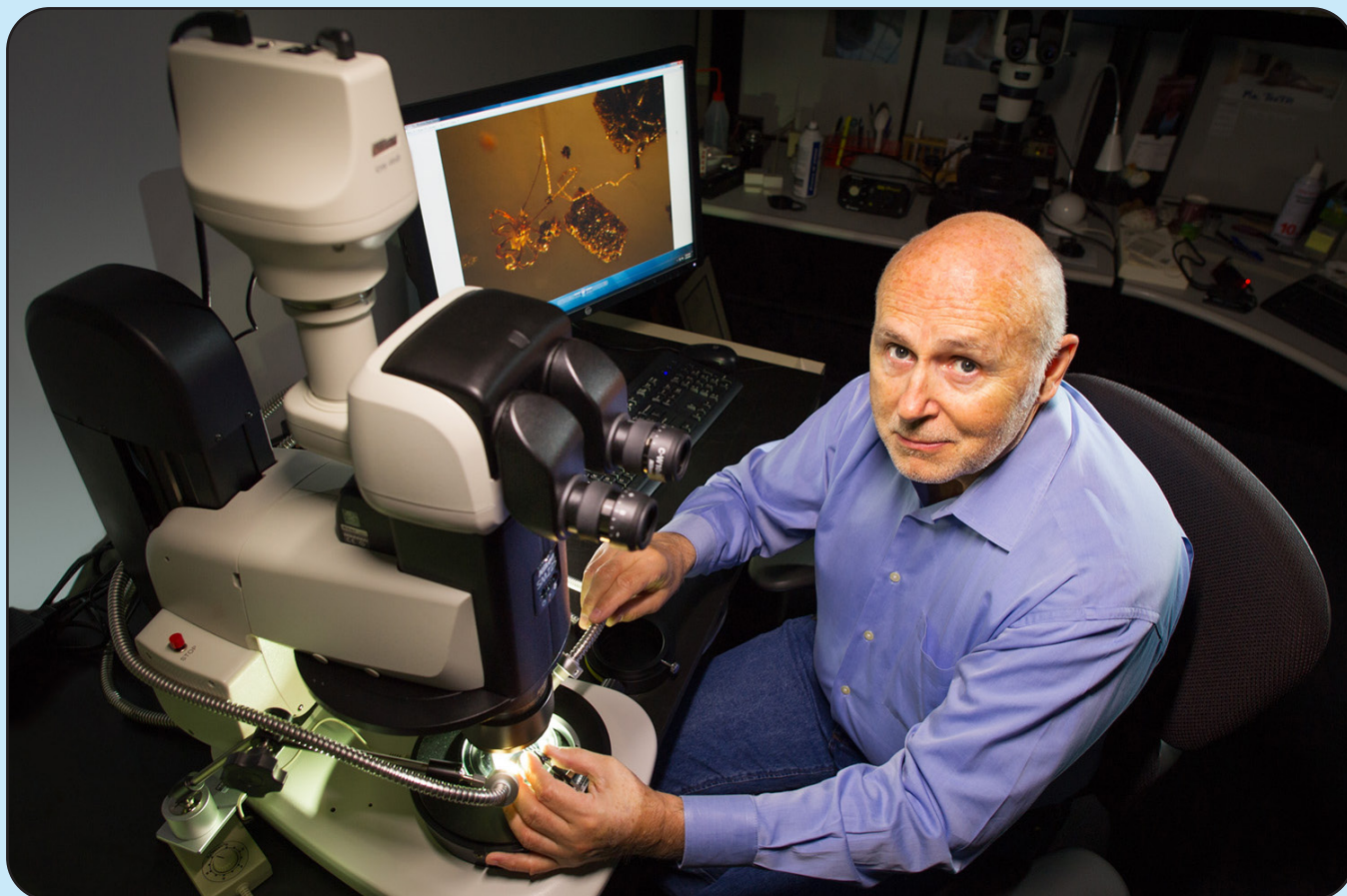
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Princess Cut Diamond (Photo by Tino Hammid)



If you do not have the three volumes of the Photoatlas of Inclusions in Gemstones in your gemmological library you should. A true giant in our industry who has done more than shape our industry. Meet the man behind the microscope and the photo lens.... GIA's John Koivula.



John Koivula in Action

John Koivula joined the GIA in 1976. He has spent more than fifty years studying and photographing the microworld of gemstones, and has published numerous articles and notes on inclusions in gemstones and related topics.

John is a contributor to several books including the American Geological Institutes Glossary of Geology, Robert Webster's Gems, Geologica, a book on crustal landforms, and the GIA's Diamond Dictionary.

Mr. Koivula is co-author with Dr. E. Gübelin of the Photoatlas of Inclusions in Gemstones, Volumes 1, 2 and 3, and the author of The MicroWorld of Diamonds.

John holds university degrees in both geology and chemistry, the gemmological credentials: G.G., C.G., F.G.A., and he was awarded fellowship in the Royal Microscopical Society (FRMS).

He is an honorary life member of the Finnish Gemmological Society and the Gemmological Association of Great Britain, and was named as one of the 64 most influential people of the 20th century in the jewelry industry by Jewelers' Circular Keystone Magazine. His awards include GIA's Richard T. Liddicoat Award for Distinguished Achievement, the Robert M. Shipley and Richard T. Liddicoat awards from the American Gem Society, the Scholarship Foundation Award from the American Federation of Mineralogical Societies, and the Antonio C. Bonanno Award for excellence in gemology by the international Accredited Gemologists Association.

He previously worked for Cominco American as an exploration field geologist, and is currently the analytical microscopist at the Gemological Institute of America, headquartered in Carlsbad, California.

Without question, John Koivula is the master of gemstone inclusion photography. His Photoatlas of Inclusions in Gemstones (Volumes 1, 2 & 3) is undoubtedly the most valuable reference tool available to gemmologists today. Replacing the need to have physical samples, they provide the most comprehensive and exhaustive collection of inclusion photographs available.

We were thrilled to not only include some of his wonderful photographs in this issue but also to get some insight to what makes John tick.

A giant in our industry and a very friendly one at that!

GT: When did you first develop a passion for inclusion photography? Was there a defining moment when you realised this was what you wanted to do?

JK: Inclusion photomicrography was a natural offshoot of inclusion research and collecting for me. As my collection grew I found that I wanted to communicate with others the wonderful inclusions that I was seeing on a somewhat regular basis. That meant that I would have to photographically record the inclusions I was studying. My first photomicrographs were taken when I was 12 years old. They were crude by today's standards, but they got the job done. There was never really a defining moment. My passion for inclusion studies and photomicrography just evolved over time.

GT: Accomplished anglers always talk about the 'one that got away'. Is there one inclusion shot that has eluded you over the years?

JK: The 'one that got away' for me was a perfect octahedron of gold included in a colorless transparent quartz crystal. It was for sale in Tucson at the annual gem and mineral show. I didn't have the money to buy it at that time, but I should have stretched my budget somehow. Now I repeatedly kick myself for not getting it. The only "photomicrograph" I have of that gold crystal in quartz is locked away in my mind, in memory, as it once appeared through a 10X hand lens.

GT: What is the one inclusion photograph that sticks in your mind the most, either through the sheer beauty of the inclusion or the challenge in capturing it on film?

JK: The one inclusion photomicrograph that sticks in my mind the most, both for the sheer beauty of it, and also for the difficulty in capturing it on film, would have to be the iridescent hematite and ilmenite plates in oligoclase feldspars from Harts Range, in Australia. To get a good photo of these inclusions you first have to specially prepare the subject so that the plane of the inclusions is at a shallow angle to the surface of the host feldspar. And for that you will need the skills of a lapidary artist.

GT: In a world where photographs are now primarily taken with digital cameras, is there still room for analog film?

JK: In one respect, as a means of taking a photomicrograph, film has gone the way of the dinosaur. But, that is not to say that film is completely useless. As for example, I have a few thousand photomicrographs that have never been published. They are in 35 millimeter slide format. In order to use them in the digital world you have to scan them with a 35 millimeter slide scanner to create digital files. I am in the process of doing that now.

GT: How has digital technology changed your approach to inclusion photography?

JK: Thanks to the digital age I can now shoot many more images of the same subject under a wide variety of lighting conditions. You don't have to worry about the costs of film and developing anymore. The only element of concern is one of time usage.

GT: With software such as Photoshop, many photographers are finding it easier to create stunning imagery. Are you a purist or have you embraced this new technology?

JK: I don't consider myself a film purist, and I have embraced the new digital technology as needed. But I also like to have my subjects "honest". I use Photoshop very sparingly, primarily to remove dust that was missed in the final cleanup of the subject just before photography took place.

GT: What in your opinion is the one mistake all up and coming inclusion photographers make?

JK: They hurry the photo and don't take those extra few moments to make sure that everything is as it should be. Lighting and subject preparation should never be hurried.

GT: Guitarists are always asked about the equipment they use and the ones they most prefer. What are the 'essentials' in your photographic arsenal?

First off I would say a photomicroscope with excellent optics. In photomicrography there is no substitute for good optics. Then, at the very least, a minimum of one fiber optic illuminator is necessary. I use two units with a single light wand on each. That way you can move one of the lights without moving the other one. And finally there are an array of cleaning supplies to control dust and dirt. The cleaner your subject is in the field of view before you photograph it, the less time you will need to spend in Photoshop removing dust and dirt with the Photoshop tool kit.

GT: Having carried your three volumes of the Photoatlas of Inclusions all around the world, are there any future plans to go digital?

JK: The publisher holds the publishing rights to the books, and they have no plans of that nature at this point in time. I do have thousands of excellent images under my control that have never been published before. I have to do something with all of those images, so maybe I will try my hand at digital publishing.

GT: Where do you see the future of gemmology ten years from now?

JK: My primary tool in gemology is the gemological microscope. I feel that the microscope is still the most important tool in our field of study, and I don't see that changing. I see a place at the table both for traditional gemology, and also for advanced forms of instrumentation. The problems that plague us now will still be problems in 10 years, as for example the separation of natural diamonds from synthetics. I am in my late sixties now and plan on working at the GIA for at least another 10-years, so I guess I will see if what I think now does come true.

GT: You are truly an iconic figure in our industry. Do you sometimes find the weight of expectations too much at times?

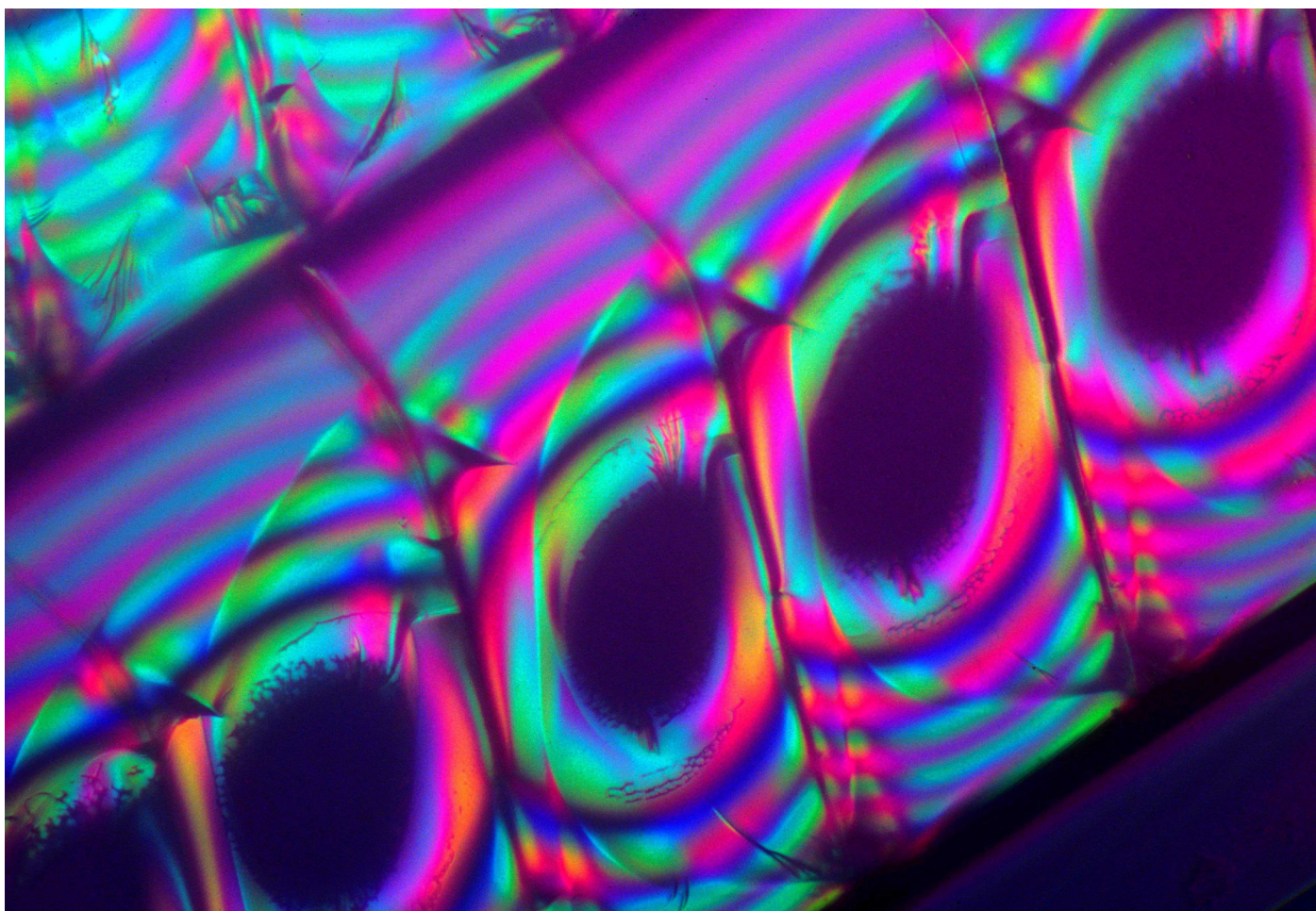
JK: I don't feel much like an iconic figure, and I don't feel that the weight of expectations is too much either. I work in a great place with a great group of people in the research laboratory at the GIA, and I basically get paid to do my hobby, gemology. Examining gems and minerals is a great way to spend your days.

GT: If we were sitting here a year from now celebrating what a great year it's been for John Koivula professionally, what would you say was the reason?

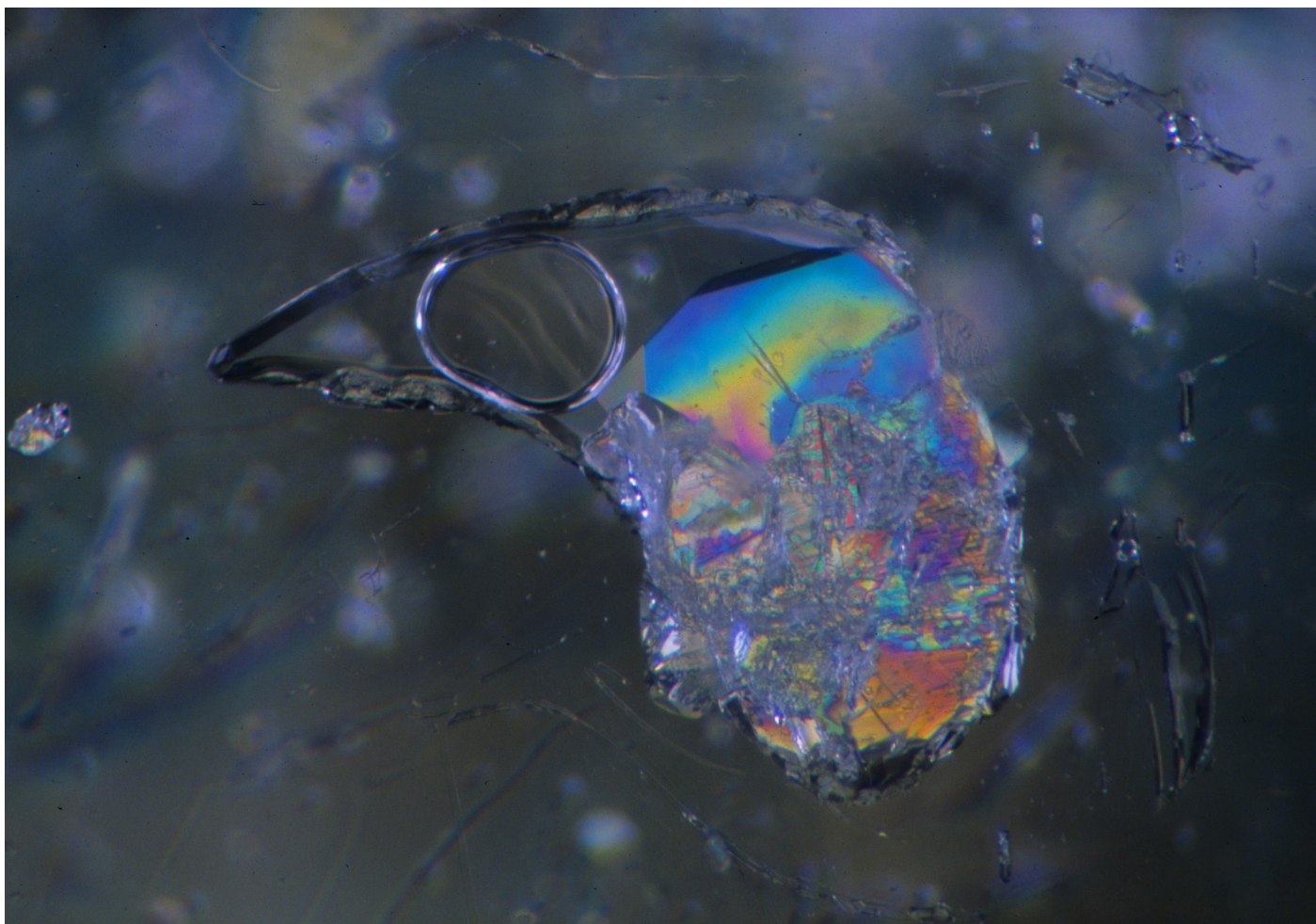
JK: As I get older I find that good health is the most important aspect in my life. Without good health nothing else is enjoyable, including the study of inclusions. So if we are celebrating what a great year it has been for me professionally, then we are also celebrating what a great year it has been health-wise. To all my friends I wish you good health and happiness, as well as many beautiful and interesting inclusions.

Photographic Copyright: John Koivula.

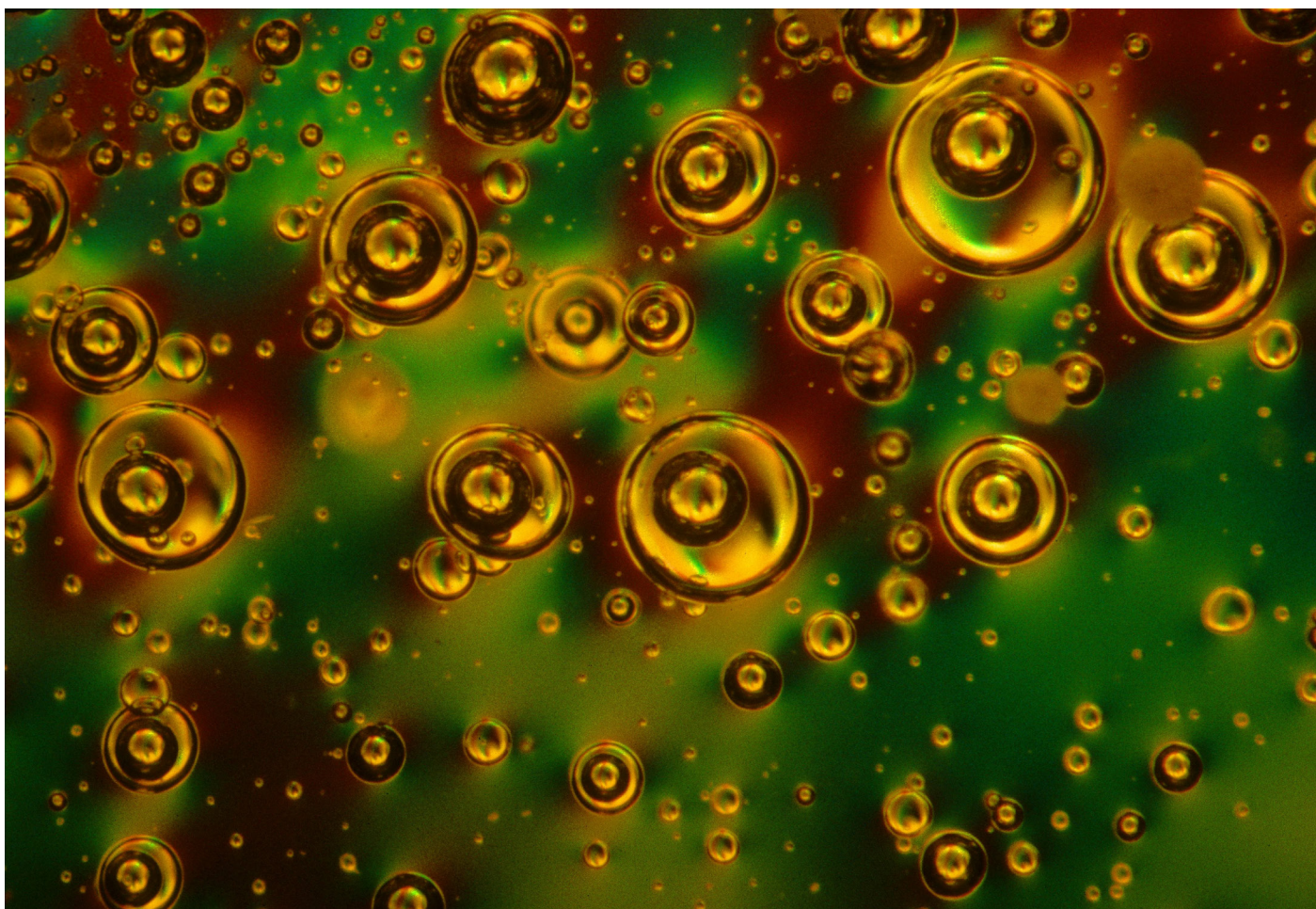
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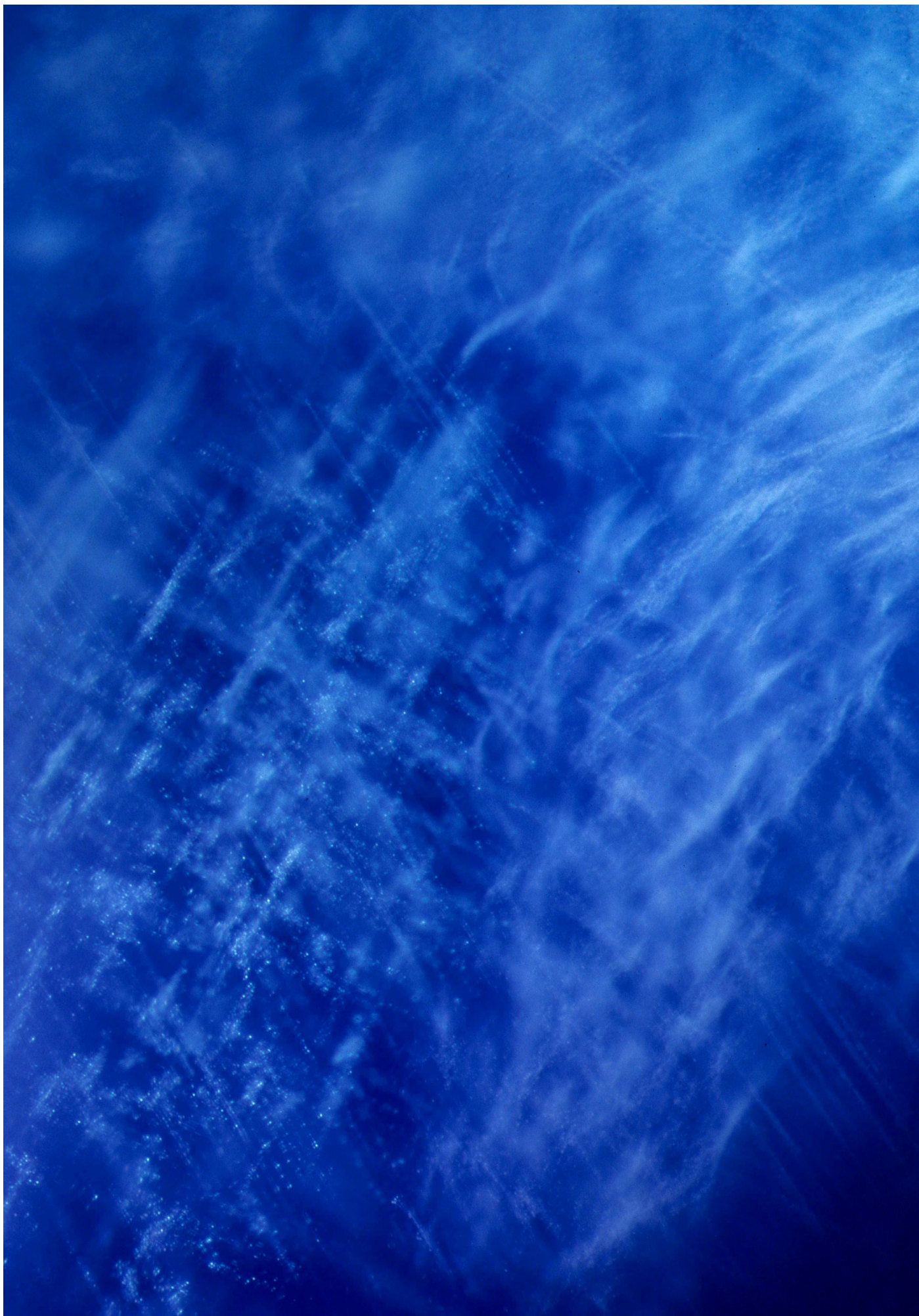
Iridescent planar conchoidal crack in an Elbaite Tourmaline (Field of View 0.5 cm)



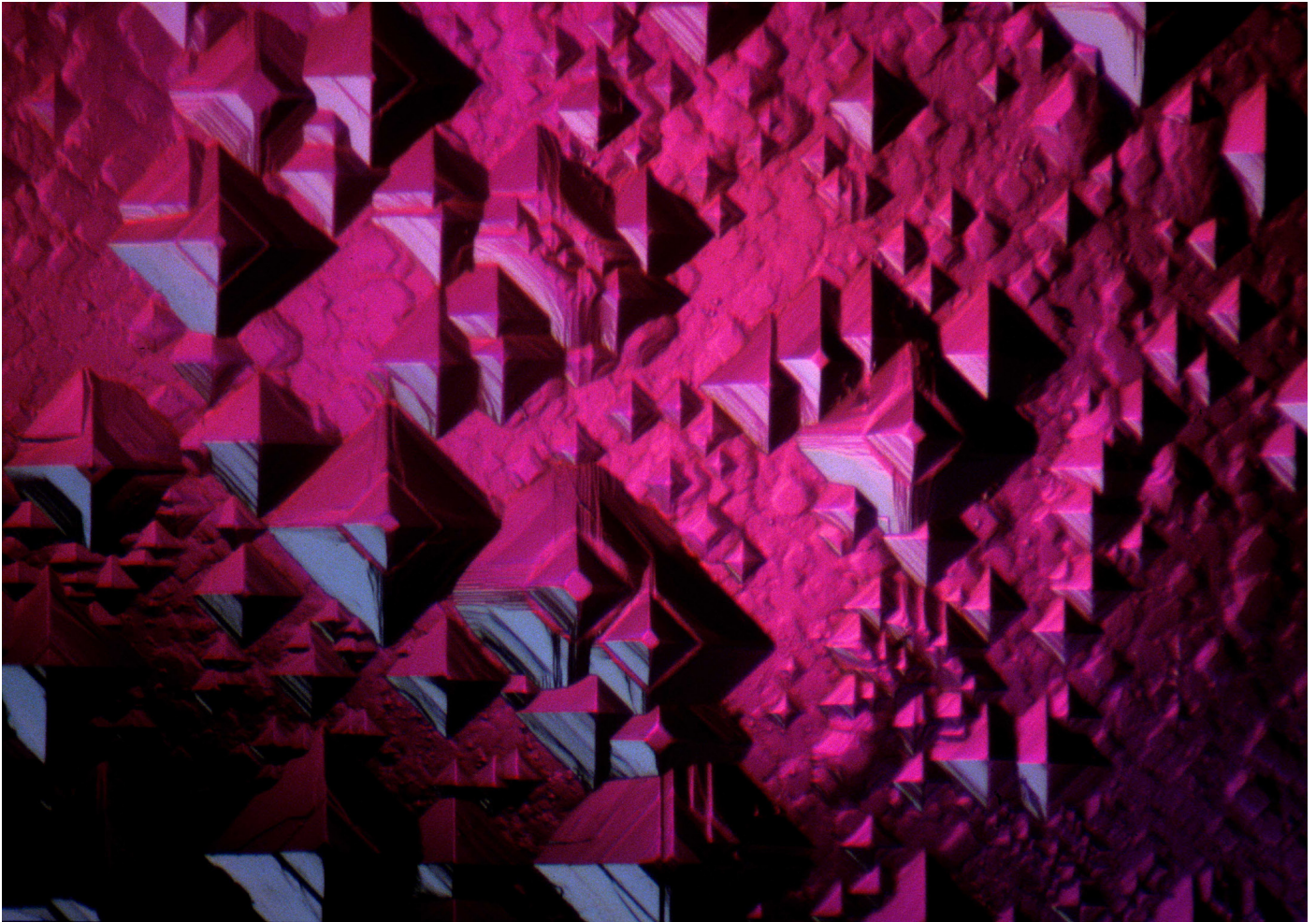
Beryl with complex primary three-phase fluid inclusion (Field of View 1.0 cm)



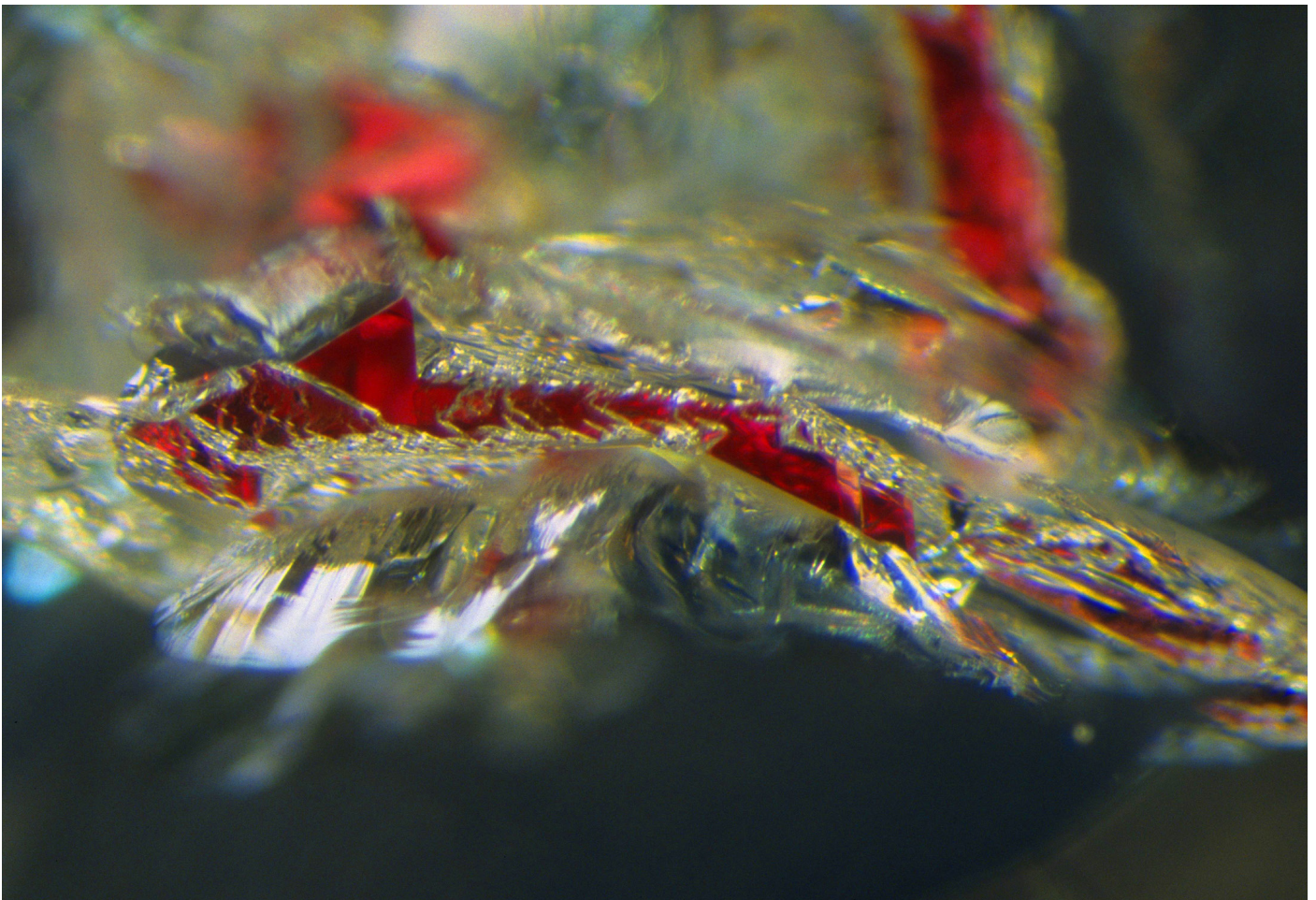
Droplets of dew or rainwater with air bubbles floating in them captured in amber from the Dominican Republic (Field of View 1.2 cm)



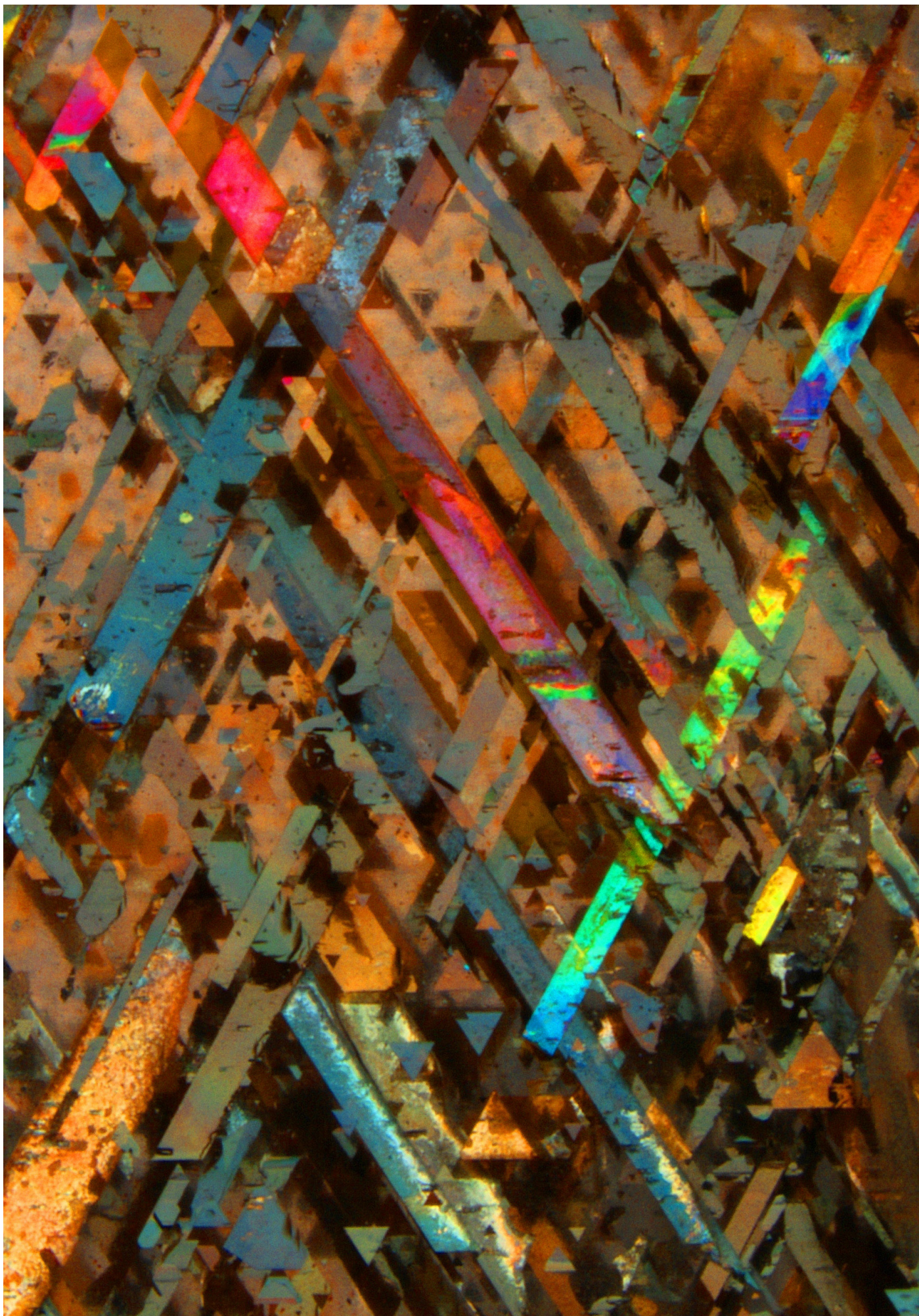
Exsolution cloud scene in unheated natural Blue Sapphire (Kashmir) (Field of view 0.8 cm)



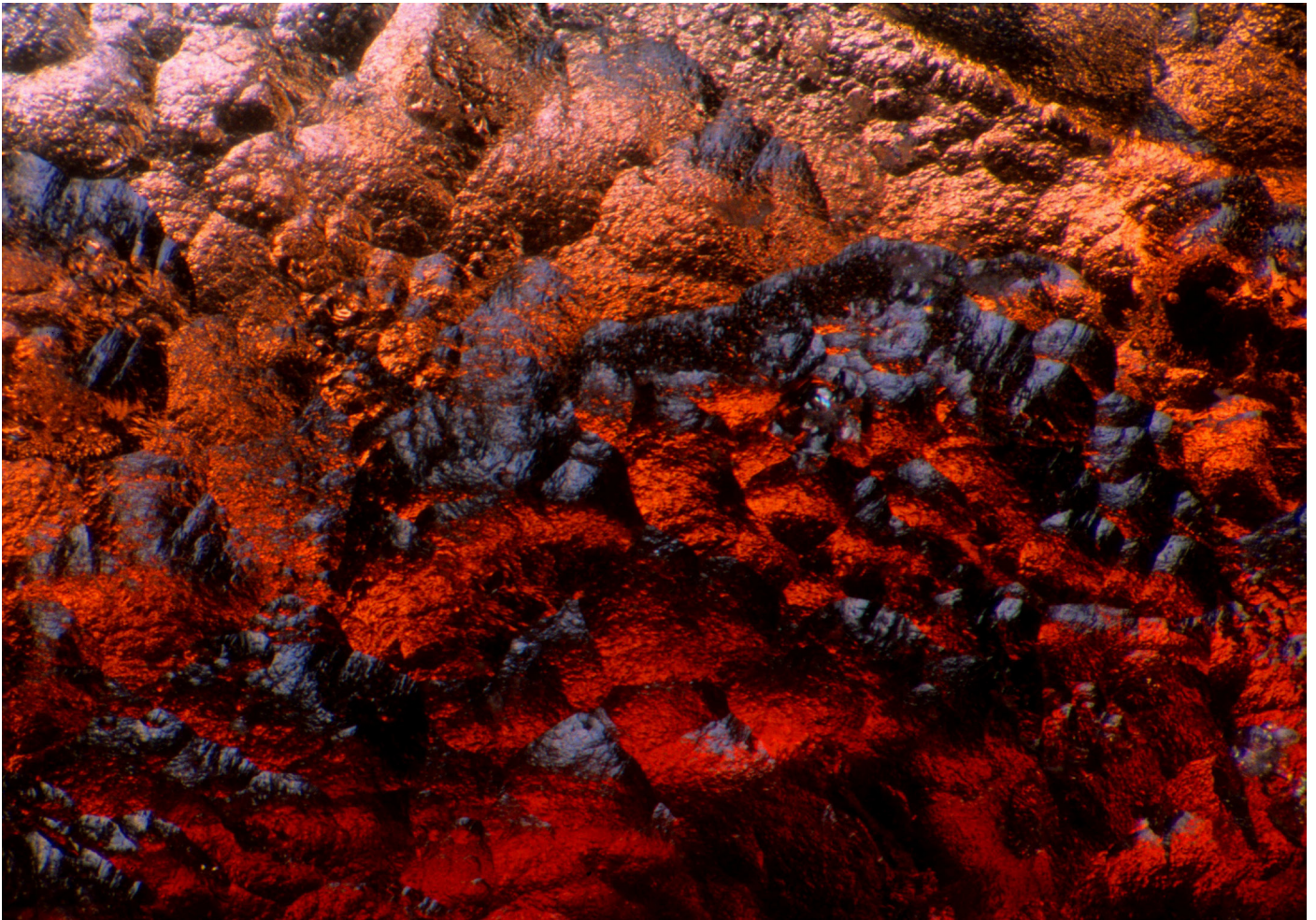
Fluorite from England showing octahedral growth features (Field of View 1.1 cm)



Xenomorphic Pyrope Garnet in Peridotitic Diamond (Field of View 1.0 cm)



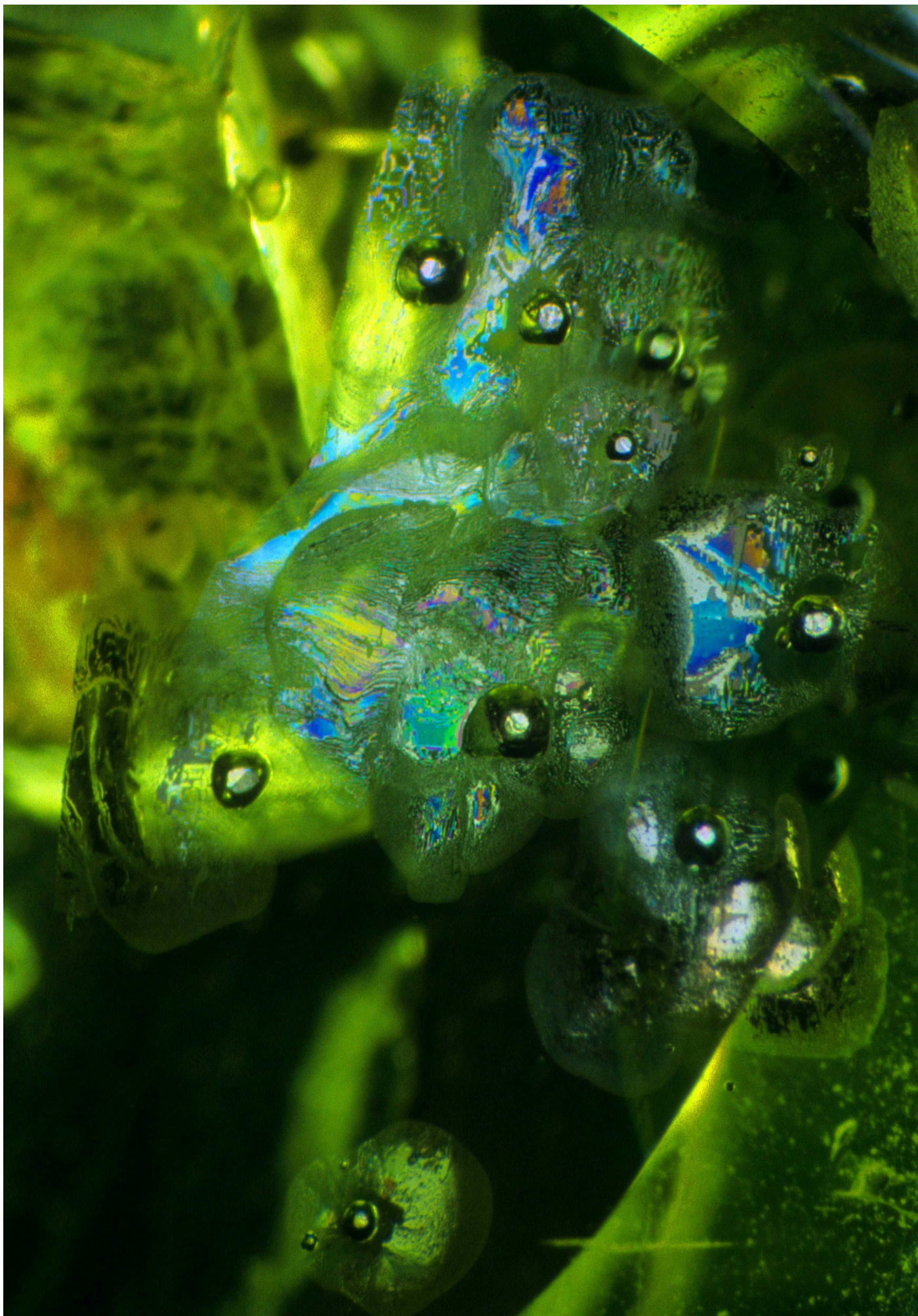
Australian Oligoclase Sunstone with iridescent Hematite and Ilmenite (Field of View 0.8 cm)



Spessartine Garnet from Brazil with 'lava flow' texture (Field of View 1.6 cm)



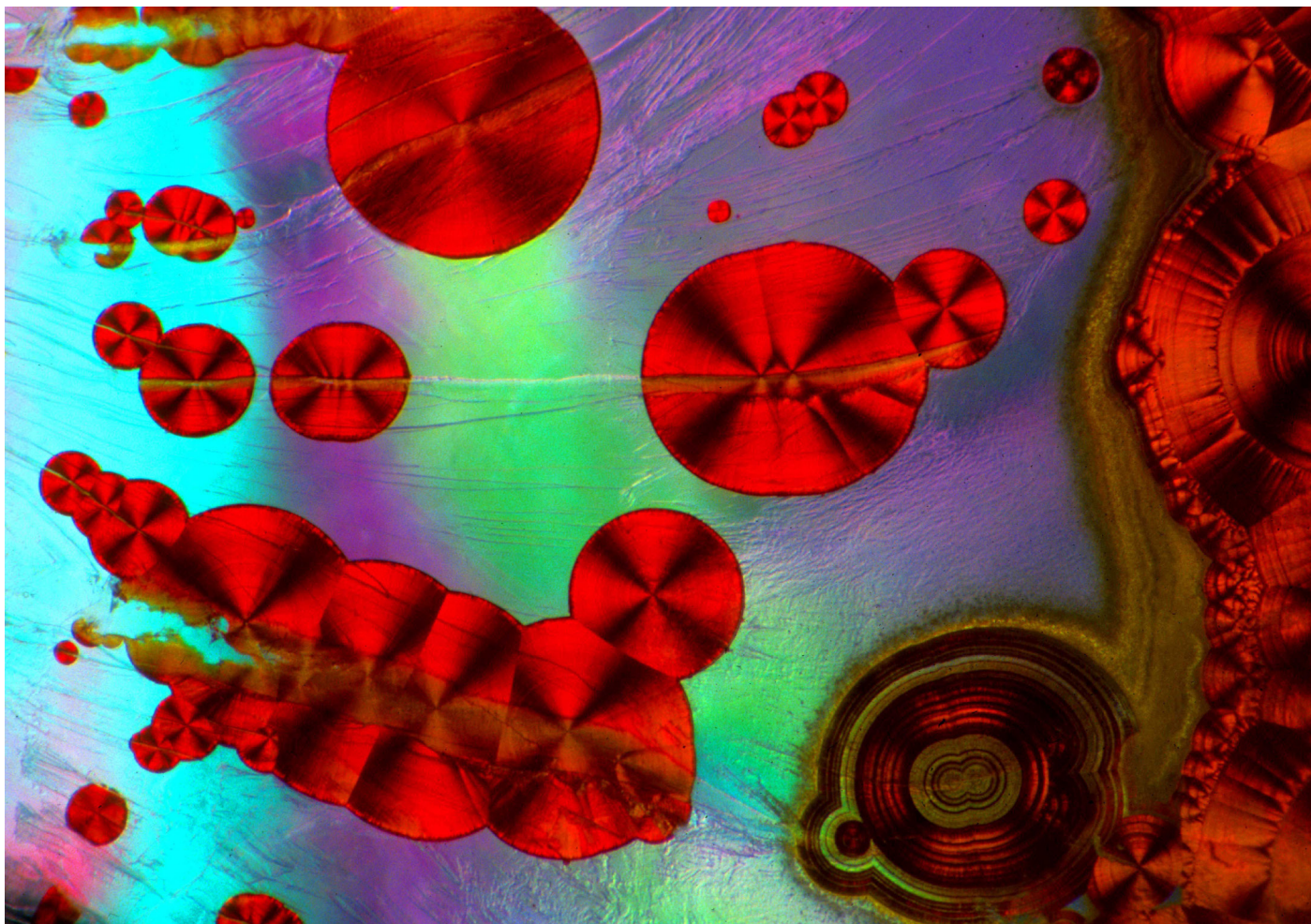
Delicate glass spines on the edge of a Moldavite (Field of View 0.7 cm)



Peridot from Arizona with multiple melted sulfide crystals (Field of View 0.9 cm)



Petrified Dinosaur Bone showing 'tire track' structure (Field of View 1.1 cm)



Rock Crystal Quartz with epigenetic bright red Hematite radial concretions (Field of View 1.3 cm)

Gemmology Today Quiz #5

All things gemmological that
are also geographical!

If the world is your oyster,
how big is your oyster?

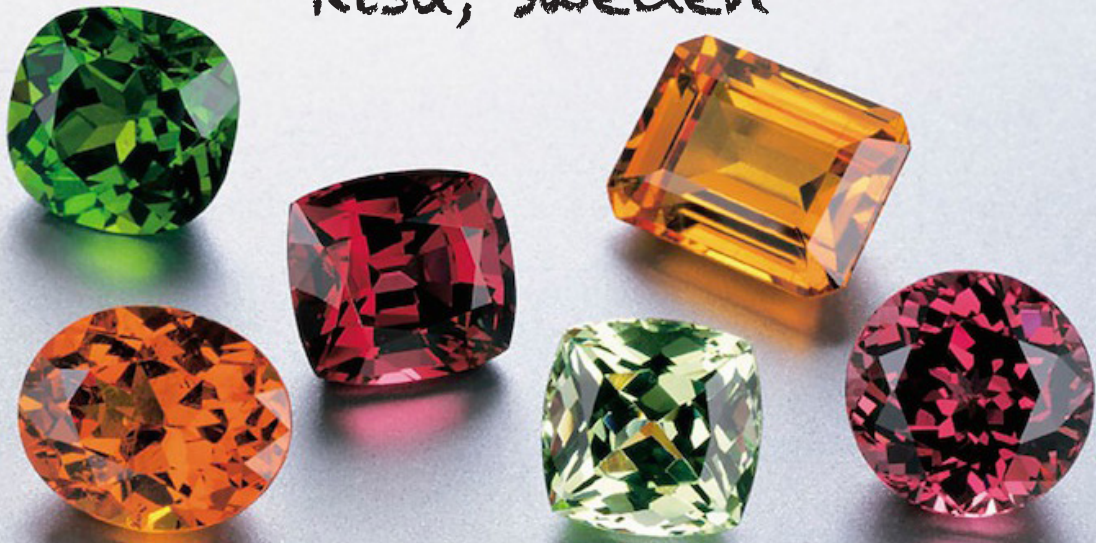
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The Great Inflate - Now you see it, Now you don't



Eightstar™ Diamond (Photo by Tino Hammid)

How do we define quality and more importantly how do we recognize it?

The other day I was in my favourite department store here in Palma. I found myself on the Men's clothing floor. Now I don't want to date myself but I can remember a time when clothing stores were organized by product (i.e. sweater department, shirt department or the suite department).

Today everything is merchandised by brand. So if you want to buy a sweater, you have to go to the individual brand counters until you find the one you want. Of course the 'Brands' think we are all 'brand loyal' but are we? I certainly am not. Quite frankly I don't care who made it as long as it looks good.

Clothing is an interesting commodity because superficially two items can look very much the same. It is only when you examine how they have been made and try them on

that the quality of the product is truly evident. Of course you then have to decide if you can justify the sometimes disproportionately higher pricing but at least you can see why one product should sell for more than the other.

Fifteen years ago, out of sheer frustration, I decided to sell my car. I was living in Vancouver at the time and was tired of the traffic, the inability to find parking and the extortionate prices they charged. I decided that a change of lifestyle was needed and started walking more, running, cycling and using public transport. I continued this trend when I moved to Palma because it is a great walking town. Since it is also a 'tourist mecca', it has, in my opinion, one of the best public transportation systems I have ever experienced.

To me a car was always a utilitarian item; something that got me from Point A to Point B. I can appreciate the difference in quality between a Fiat 500 and an Aston Martin DB11 Volante but then again, is it worth the difference in price? After all, both will get you where you want to go although I have to admit, the latter will get you there in a much grander style!

For years I resisted Apple computers. I thought it was all hype. I finally relented, tired of battling Microsoft, the constant updates, operating systems and the anti-virus software.



Aston Martin DB11 Volante™

I have to admit that it was love at first sight. I truly thought I had died and gone to computer heaven. Yes it was far more expensive but to be honest, if I added up the cost of all the PC's I had owned over the years, I would probably have saved money if I had not been so pig-headed. I had to get used to a completely different mind set but everything about a Mac, in my opinion, is superior to a Windows PC.

From my own experience selling digital downloads, I do see a difference between Mac and Windows users. Mac users do tend to be a little more savvy and I think this perhaps has to do with the fact that today you can buy entry level PC's for less than € 400. For the makers of these computers this has opened up a whole new market but in my opinion they have been sold, intentionally or unintentionally with higher than achievable expectations.

I could go on and on about consumer products but the point I am trying to make is that when we buy a product, the quality is typically evident once you start to use it. But what about diamonds? Can the same be said about them?

Cut

When I used to sell diamonds I would always remind my clients that they were buying a colourless gemstone. They were not buying a coloured gemstone where the richness and depth of colour was of paramount importance. They were buying a gemstone where the absence of colour (other than fancy coloured diamonds) was important.

If we were to survey ten people on the street and ask them to participate in a game of 'word association' with diamond, I am sure many would use words such as 'brilliance', 'sparkle', 'fire' and 'scintillation'. Some might mention 'purity' or 'lack of colour' but the majority would focus on the one thing that we should be selling and that is the brilliance of a diamond. Without brilliance, a diamond is just another colourless stone.

If we look at the chart below we can see how cut affects the value of a diamond and I am quietly confident that if we showed those same ten people an 'Ideal' cut and a 'Good' cut, the majority would be able to see the difference.

Cut Comparison

Cut	D VVS-1	D VS-1	D SI-1
Ideal	+5 - 7%	+5 - 7%	+5 - 7%
Excellent	List	List	List
Very Good	-5 to -8%	-5 to -8%	-5 to -8%
Good	-12 to -17%	-12 to -17%	-12 to -17%
Fair	-15 to -25%	-15 to -25%	-15 to -25%
Poor	-25 to -40%	-25 to -40%	-25 to -40%

Carat Weight (Size)

Thanks to De Beers and other diamond marketers, consumers are now convinced that a one-carat diamond is infinitely more desirable than a ninety-seven-point diamond and are prepared to pay premium prices to get one. This insistence on elevating a one-carat diamond to this almost 'mythical' status has only lead to a proliferation of poor cuts, an incentive for cutters to try and squeeze as much weight out of a diamond as possible. Of course for those of us to know a thing or two about diamonds, we penalise these cutters for sacrificing brilliance for weight but the average jeweller and consumer simply does not know the difference. Consequently we find Jeweller A selling his one-carat G colour, SI-1 clarity for 'X' dollars while Jeweller B is offering his for 20% less. You cannot compare apples to oranges but unless you know the difference, how would you really know?

Unlike cut, slight differences in weight are not easy to see, in fact, a one-carat diamond might well have the same diameter as a ninety-seven-point diamond yet the client is paying a premium price for the one-carat stone. GemGuide do address this problem by adding 'premiums' (ranging from 5 to 20%) for diamonds that fall short of these important weight categories but these premiums still do not offset the difference.

The chart below compares the percentage differences between one-carat diamonds and those that fall just shy of one-carat. For comparative purposes I have used the full 20% premium with a one-carat diamond as the baseline.

Weight Comparison

Weight	D VVS-1	D VS-1	D SI-1
.97ct	-13%	-24%	-6%
.95ct	-15%	-26%	-8%
.93ct	-31%	-39%	-25%

Colour

Unless you are buying a fancy coloured diamond, an absence of colour is preferred but here again, if we were to show the same ten people a D, E and an F colour diamond, few would be able to see any difference. Even accomplished diamond graders use certified master stones to differentiate between them yet a D colour will sell for substantially more than an F colour.

Currently, a D colour VVS-1 diamond will sell for 45% more than an F colour VVS-1 while a D colour VS-1 will sell for 28% more than an F colour VS-1 and a D colour SI-1 will sell for 8% more than an F colour SI-1.

Clarity

A correctly graded SI-2 diamond will not have any eye visible inclusions. This means that of the eleven clarity grades, only three will have inclusions that are visible to the naked eye.

However if we look at the prices of a D colour IF diamond and a D colour SI-2 diamond, the IF diamond sells for 254% more while an F colour IF diamond will sell for 106% more than an F colour SI-2!

Now before you start jumping up and down, pounding your fists on the desk and having a shortness of breath, I do understand that a D colour diamond is rarer than a K colour, an internally flawless diamond is rarer than an SI-2 and a two-carat diamond rarer than a one-carat diamond but just like other products we buy, should we really be paying extra for products where the difference in quality is indiscernible even to a trained professional?

Certainly many people do and all the power to them but sadly their priorities are often misplaced with emphasis placed on the wrong 'C's'.

If you buy a superior cut that also has a higher colour and clarity grade then that is fine but if you sacrifice the cut for a higher clarity and/or colour grade that is indiscernable to the naked eye then essentially you have just shot yourself and the person who will be wearing it in the foot.

In a world where the house we live in, the car we drive, the clothes we wear and the accessories we adorn ourselves with define how successful we are, isn't it time we started to sell diamonds that make a statement without the need to show your friends and acquaintances the accompanying diamond certificate?

After all, quality should always shine through especially if you are a diamond.

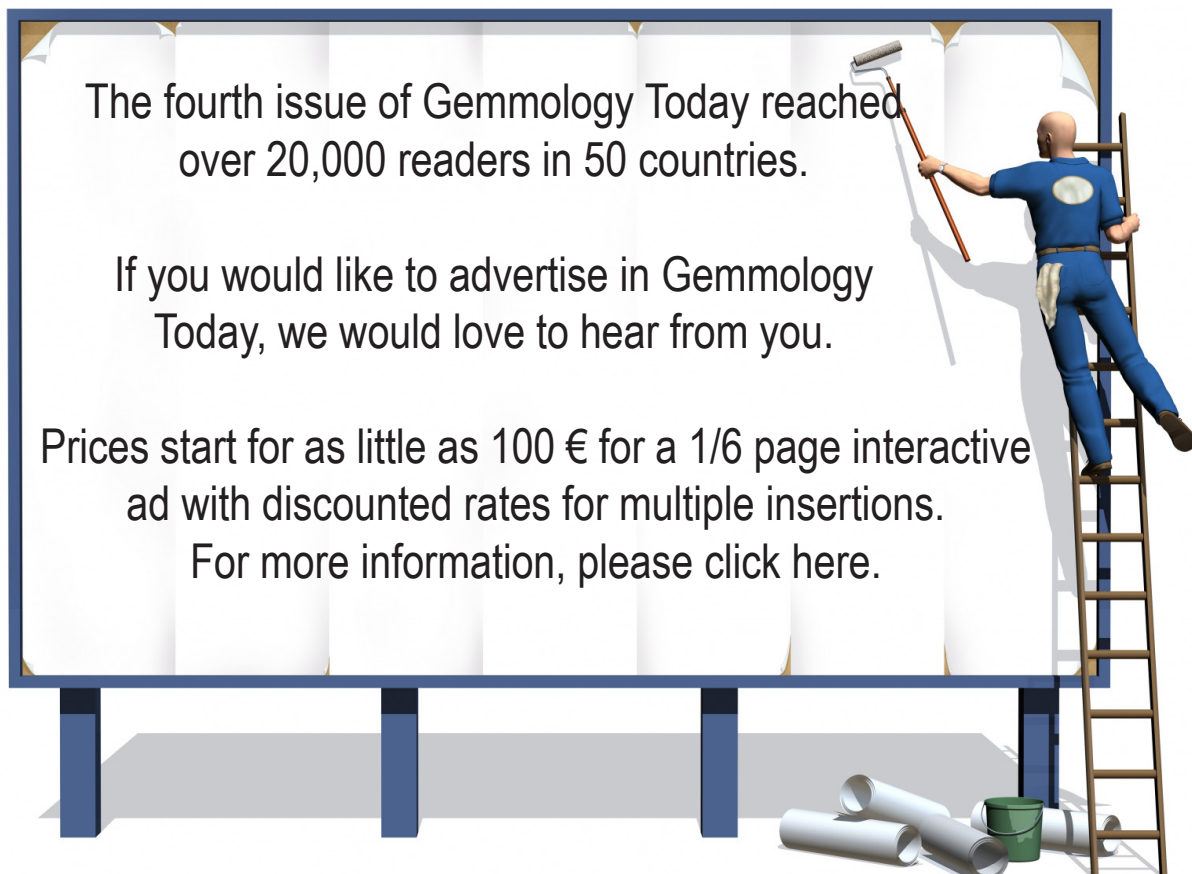


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E-mail all submissions to
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In this issue we look at tanzanite; how to identify it, it's affordability and it's stunning transformation when the heat is on....

Tanzanite - The New Kid on the Block



Tanzanite Regal Radiant™ (21.45cts) Cut by John Dyer (Photo by Lydia Dyer)

One of the newest gemstones to enter the market place, Tanzanite is both unique and rare compared to other gemstones.

Found at only one locality worldwide in the Merelani Hills near Arusha (Tanzania) in the shadow of Mount Kilimanjaro, it was first discovered in 1967 by a Maasi tribesman by the name of Ali Juuyawatu. He in turn showed it to Manuel de Souza, a part-time gem prospector who initially thought that it was either sapphire, olivine or dumortierite. De Souza consulted John Saul, a noted geologist and gem wholesaler based in Nairobi, Kenya who sent samples to his father Hyman Saul, the vice-president of Saks 5th Avenue in New York to take to the Gemological Institute of America (GIA).

While the Gemological Institute of America, Harvard University, the British Museum and the Heidelberg University have all been credited with the correct identification of the samples as a variety of the mineral zoisite, records seem to indicate that the first positive identification of the material was in fact made by Tanzanian Government geologist Ian McCloud.

In 1968, Henry B. Platt, great grandson of Louis Comfort Tiffany and later president and chairman of Tiffany & Co. in New York christened the newly discovered gemstone 'Tanzanite' and in what can only be described as a marketing coup introduced it with great fanfare throughout Tiffany & Co. declaring that there were only two places in the world in which tanzanite could be found 'Tanzania and Tiffany's'. This distribution exclusivity was held by Tiffany & Co. until the mid 1980's.

Gemstone	R.I. Range	D.R.	D	O/S	S.G. Range	H
Kyanite	1.710 – 1.734	.015	.020	B-	3.53 – 3.70	4 to 7
Lab-created Spinel	1.727	–	.020	I	3.54 – 3.63	8
Spinel	1.712 – 1.730	–	.020	I	3.54 – 3.63	8
Idocrase	1.700 – 1.723	.002 – .012	.014	U+	3.32 – 3.47	6 ½
Tanzanite	1.691 – 1.700	.009	.030	B+	3.35	6 ½ – 7
Lab-created Forsterite	1.634 – 1.670	.033 – .038	–	B+	3.22	7

While tanzanite does bear a striking resemblance to blue sapphire, the marked differences in their refractive indices, specific gravity, optical nature/sign, and pleochroism make their separation relatively easy unless one is dealing with small accent stones.

Kyanite is also biaxial however careful measurement of the refractive indices noting which shadow edges move and to what degree will reveal that it is biaxial negative whereas tanzanite is biaxial positive. In an undiluted solution of diiodomethane (S.G. 3.33), tanzanite will freely suspend while kyanite will sink.

Natural and lab-created blue spinel also have similar refractive indices, however their isotropic nature will be revealed under crossed polars.

Proficiency on the refractometer will also help to differentiate idocrase (uniaxial positive) from tanzanite (biaxial positive).

Lab-created forsterite is an effective imitation of tanzanite and can be distinguished by its lower refractive indices and higher birefringence. If unset, stones will float in an undiluted solution of di-iodomethane (S.G. 3.33), whereas tanzanite will sink.

Using the Hanneman tanzanite filter, lab-created forsterite will exhibit a greenish body colour, while tanzanite will appear a pinkish-orange colour along with its correct dichroic colours. Under short wave UV light, lab-created forsterite will appear a weak greenish-yellow and a chalky orange-yellow under long wave UV light. Tanzanite will remain inert under both radiations.

Heat Treatment

In its natural state, tanzanite is greenish-brown or brown in colour. Noted for its strong pleochroism, un-treated tanzanite is trichroic (purple, blue and yellowish-brown). However, when subjected to heat, two notable changes occur. Firstly the colour becomes more saturated at 410 degrees Celsius and secondly at 500 degrees Celsius the brown colour component disappears.

Spectroscopic analysis of heat-treated stones shows that during this process the absorption band associated with the brown colour component is removed while the bands commonly assigned to V^{3+} are largely unchanged. Furthermore, trials conducted by Dr. Karl Schmetzer concluded that the missing absorption band could not be restored after exposing the treated stones to radiation. This supports the theory that the colour transformation does not involve an ordinary colour centre as commonly observed in numerous other minerals (i.e. certain quartz and yellow beryl).

Although this change of colour is not completely understood, a combination of absorption spectroscopy and EPR examination shows the presence of both V^{3+} and V^{4+} in untreated stones whereas only V^{3+} is present after they have been heated. While another trace element may be involved, there does appear to be some connection between the removal of the yellowish-brown colour component and V^{4+} .



Tanzanite Super Trillion™ (13.88cts) Cut by John Dyer
(Photo by Lydia Dyer)



Untreated Tanzanite (Photo by Tino Hammid)



Heat treated Tanzanite (Photo by Tino Hammid)

Tanzanite

Weight	Commercial	Good	Fine	Extra Fine
1.00 - 1.99ct	- 73.91%	- 43.48%	- 31.30%	- 21.74%
2.00 - 2.99ct	- 65.22%	- 39.13%	- 21.74%	- 13.04%
3.00 - 9.99ct	- 60.87%	- 30.43%	- 17.39%	Base

Comparison between Tanzanite, Blue Sapphire and Blue Spinel

Gemstone	Commercial	Good	Fine	Extra Fine
Tanzanite	Base	Base	Base	Base
Blue Sapphire	+ 112%	+ 209%	+ 380%	+ 660%
Blue Spinel	- 65%	- 14%	+ 22%	+ 60%

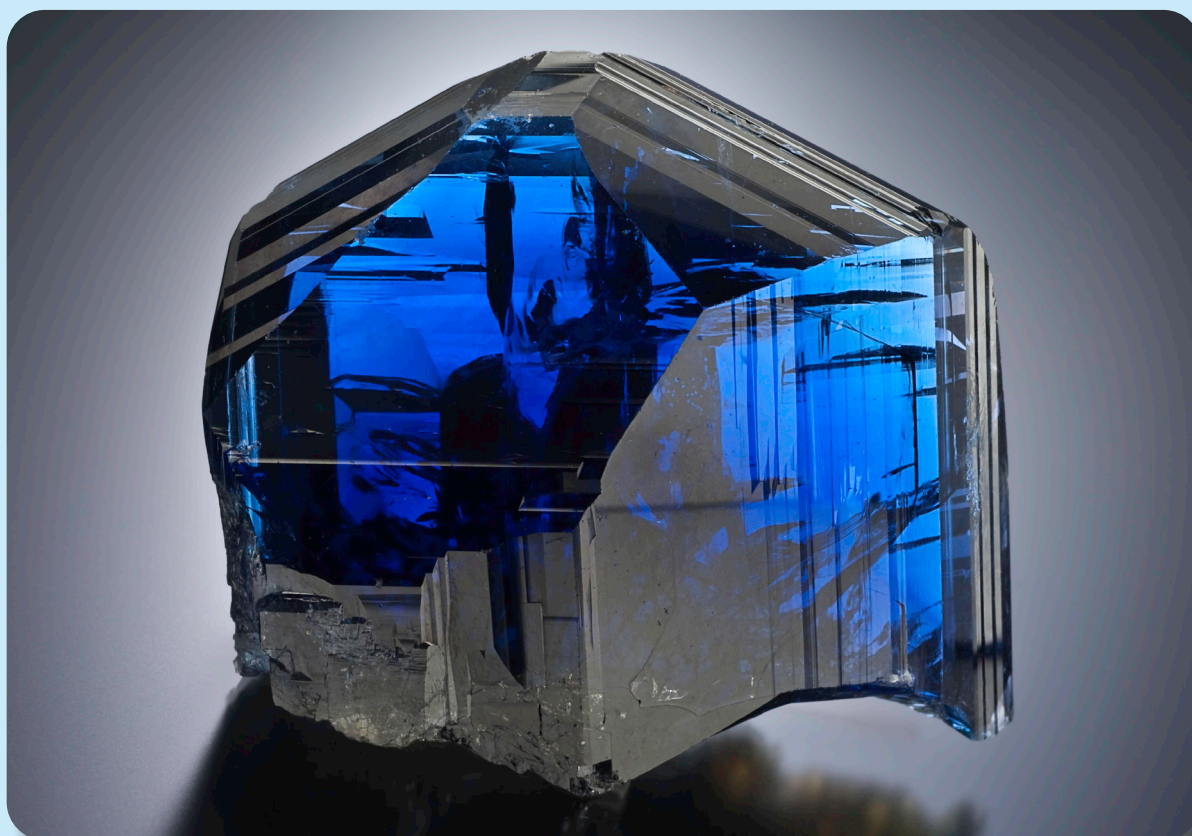
Reference: GemGuide January/February 2017

The popularity of tanzanite has risen substantially due to the astonishing prices now being realised for good, fine, and extra fine blue sapphires.

The chart above shows the percentage differentials for tanzanite in three weight categories and four quality grades. For comparative purposes, we have used a two-carat tanzanite as the baseline.

Interestingly although tanzanite continues to gain in popularity and is still only found in one locality, it is still selling for substantially less than blue sapphire and surprisingly blue spinel in the finer grades.

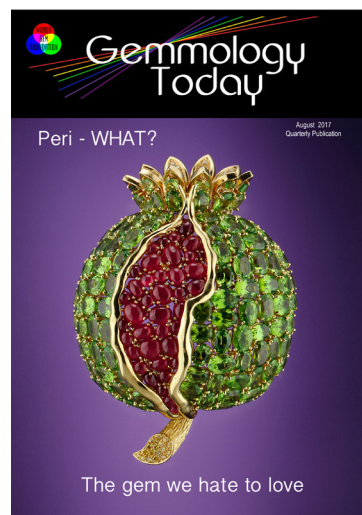
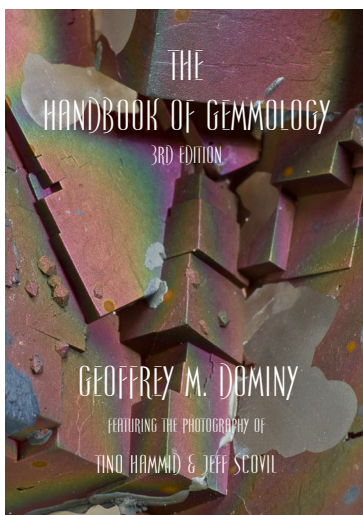
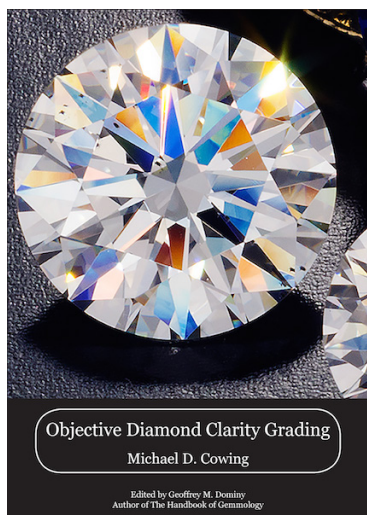
Obviously due to these huge price differentials, making the 'correct call' is of paramount importance. A relatively easy task if you know what to look for!



Tanzanite Crystal (Jeff Scovil)



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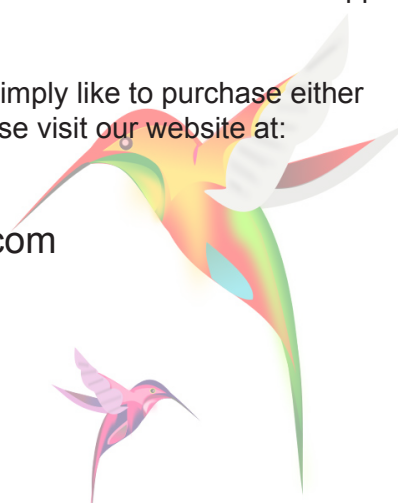
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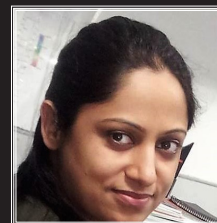
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Synthetic Moissanite - Diamond Copycat

In the world of diamond simulants, synthetic moissanite is one of the most convincing appearance wise; a seemingly perfect diamond copycat.

Colorless or near colorless and sometimes with colour, synthetic moissanite is often fashioned in the round brilliant cut to imitate diamond (the most common cut for diamond). Nowadays with the popularity of natural black diamonds, it is not uncommon to find black synthetic moissanites used in jewellery pieces.

Synthetic moissanite also has a natural counterpart, occurring as tiny green and black crystals either terrestrially or in meteorites. Since it is quite rare, it is not found in jewellery but is sort after by mineral collectors and for study purposes. Natural crystals of moissanite were identified in 1920 by Ferdinand Frederick Henri Moissan (the French noble prize winner) in the Canyon Diablo (Arizona, USA) meteorite.

The chemical formula of synthetic moissanite is SiC (Silicon Carbide), with a refractive index (R.I.) of 2.648 – 2.691 and high birefringence (0.043), causing a strong doubling effect. The doubling of back facet edges in moissanite is easily evident with 10x loupe, if it is viewed in right direction. Synthetic moissanite is generally cut with the table perpendicular to the optic axis direction, obstructing the viewer from seeing the doubling effect if it is viewed through the table. In the optic axis direction, doubly refractive material acts like singly refractive material and does not split the passing/refracted ray, therefore the doubling effect will not be visible when viewed in this direction. Doubling of back facet edges in moissanite can be seen through any facet except the table and due to the strong birefringence, moissanites often appear 'fuzzy'.

Synthetic moissanite's thermal conductivity is similar to that of diamond. Consequently many of the thermal conductivity meters which are used for identifying diamonds, may pass synthetic moissanite as a diamond and give the wrong result. Synthetic moissanite has dispersion of 0.104 which is almost twice that of Diamond (0.044), while a hardness of 9.25 (Diamond being a 10), gives moissanite a high lustre similar to diamond.

Synthetic moissanite has a specific gravity (S.G.) of 3.22 which is less than that of diamond (3.52). To rapidly separate a parcel containing loose synthetic moissanites and diamonds using heavy liquids, methylene iodide is perfect since the specific gravity of methylene iodide is 3.33, which falls between that of synthetic moissanite and diamond. In this solution, diamonds will sink because their specific gravity is higher than that of methylene iodide while synthetic moissanite will float on the surface because the specific gravity of synthetic moissanite is less than that of solution.

Synthetic moissanites are generally inert under short and long wave UV rays, although some may show weak to moderate orange fluorescence. Diamonds fluoresce in different colors under short and long wave UV rays, varying from weak to strong, or may remain inert.

Synthetic moissanite is synthesized by the sublimation technique, in which silicon carbide (SiC) is vaporized and then crystallized on the seed without passing it through a liquid state. Generally synthetic moissanite has a greenish tone due to the presence of Nitrogen (N) in the growing environment of synthetic moissanite, Nitrogen enters the lattice of the synthetic moissanite producing color. The presence of variable amounts of nitrogen in synthetic moissanite's lattice leads to variations in the color. Synthetic moissanite is also produced in black, green, blue, grey, and yellow colors. Colorless synthetic moissanite is a pure silicon carbide.

Synthetic moissanite is produced in different polytype structures (i.e. hexagonal (H), rhombohedral (R) and cubic (C) polytypes. 6H-SiC and 4H-SiC polytype [6 = the number of stacking sequence; H = hexagonal; SiC = silicon carbide] are the most common polytypes used as diamond simulants due to their gemological properties and can be grown as single crystals by the seeded sublimation technique. Earlier different polytypes of synthetic moissanite used to grow simultaneously, this phenomenon of simultaneous formation of two or more polytypes is called as Polytypism. Now, by seeded growth of silicon carbide by sublimation from the

vapour phase, it is possible to grow larger and single crystals of single polytype. Polytype of moissanite can be identified by Laser Raman spectroscopy.

One unusual feature which is never discussed and observed in synthetic moissanite is color zoning.

The most common inclusion found in synthetic moissanite are sub-parallel whitish and shiny hollow tubes or stringers. These hollow tubes are usually oriented parallel to the optic axis direction. Sometimes these stringers are thick enough to appear like irregular ribbons and may form as if fused to each other. These ribbon-like inclusions are also observed in different directions other than moissanite's optic axis direction in some samples (i.e. not parallel to optic axis direction). These elongated tubes, so-called micropipes are a typical inclusion of 6H-SiC and 4H-SiC polytype moissanites synthesized by the sublimation technique.

Other inclusions which are not usually present in synthetic moissanite are highly reflective gas bubbles and negative cavities/crystals. Gas bubbles are generally pear shaped, threaded with stringers or may be formed isolatedly without any

extended stringer. (Stringers are attached with gas bubbles as if the stringers are passing through the bubbles, or stringers are extended from the point of pear shape bubble). Synthetic moissanite may have irregular, hexagonal or more complex forms of negative cavities/crystals, which are sometimes attached with extended hollow tubes. These extended tubes or stringers with attached negative crystals may be mistaken as laser drill holes (a clarity enhancement technique often seen in diamonds).

Black synthetic moissanite are opaque and show a granular structure of tiny microspheres on their surface. Natural black diamonds, on the other hand, are never densely opaque with surface reaching graphitized feathers and black carbonaceous inclusions that are not seen in synthetic moissanite.

While synthetic moissanite is a convincing diamond simulant, noticeable differences in their specific gravity and the presence of strong birefringence make them easy to separate from diamonds using basic instrumentation.

All Photos: Copyright Meenakshi Chauhan



Figure 1: Lot of synthetic moissanite beads.



Figure 2: Angular green color zoning in synthetic moissanite.

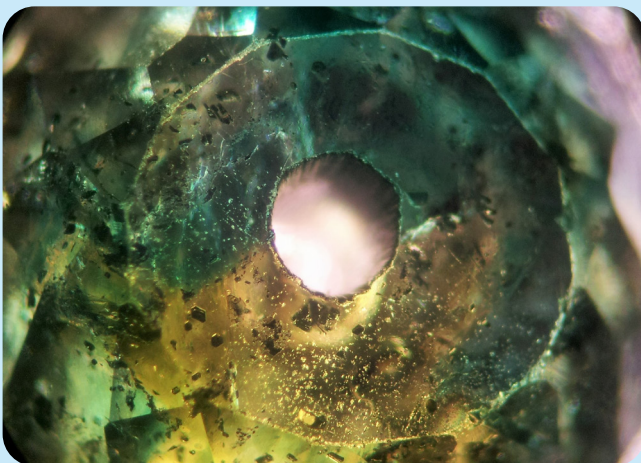


Figure 3: Color zoning is visible with hexagonal & irregular cavities/crystals and unknown black opaque dotted inclusion in synthetic moissanite.

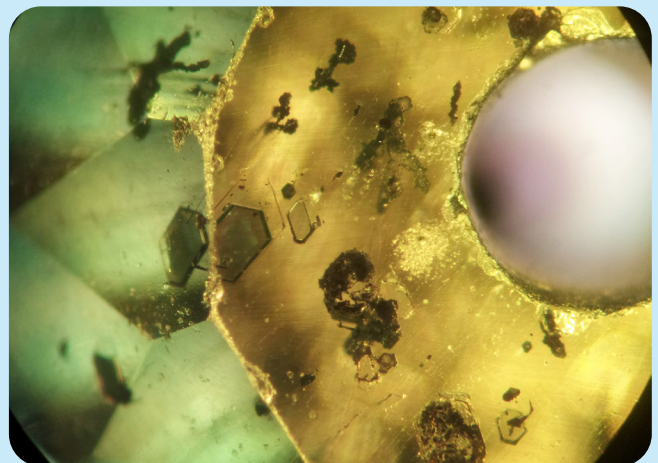


Figure 4: Hexagonal and irregular cavities/crystals and unknown black opaque dotted inclusion in synthetic moissanite. The color differences of the facets is not due to coating, rather it is visible due the combination of cut and color zoning.



Figure 5: Pear shape gas bubbles in synthetic moissanite, some with stringers extending from the points of the pear shape gas bubbles.

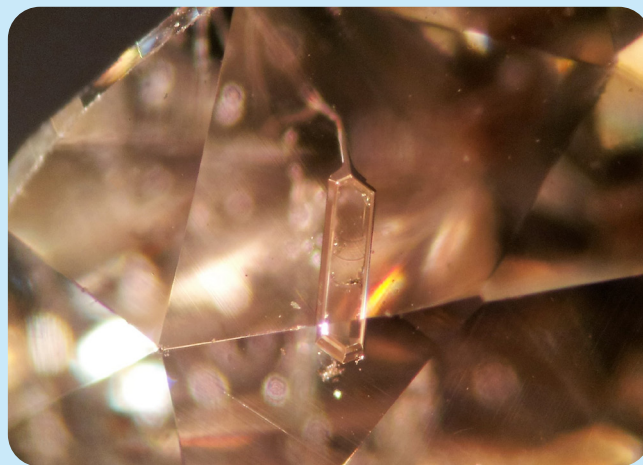


Figure 6: Hexagonal negative cavity in synthetic moissanite.

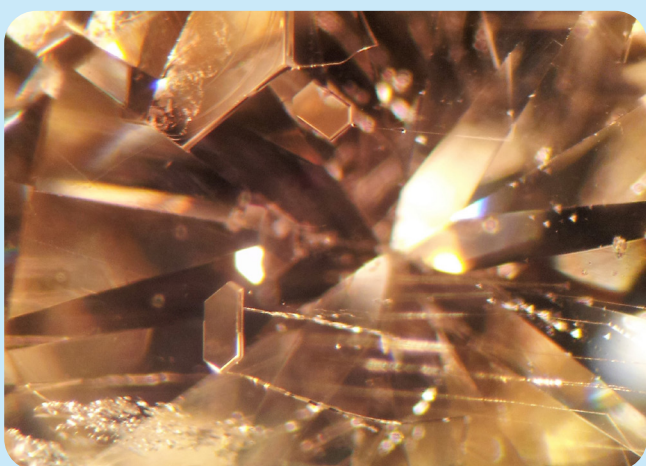


Figure 7: Hexagonal negative cavities/crystals in synthetic moissanite with extended hollow tubes. Notice the largest negative cavity/crystal being cut due to polishing of pavilion facets.

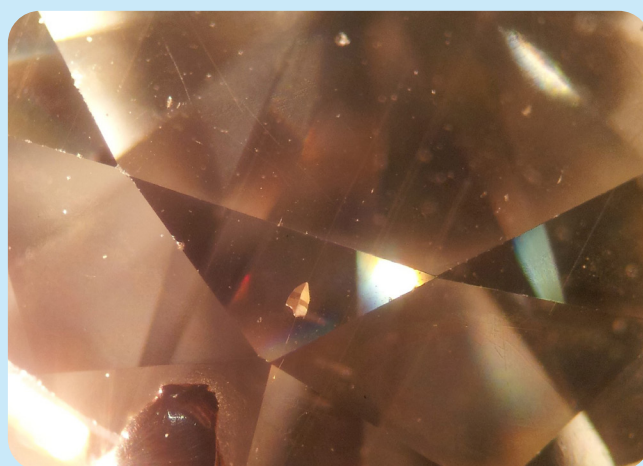


Figure 8: Bullet shape negative cavity/crystal in synthetic moissanite with extended stringer from its point.

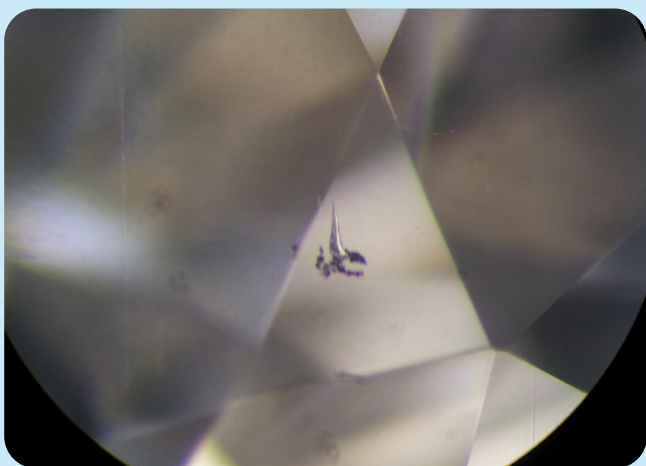


Figure 9: Nail head spicule-like inclusion in synthetic moissanite. V shape colorless cavity attached with black dotted unknown inclusion.

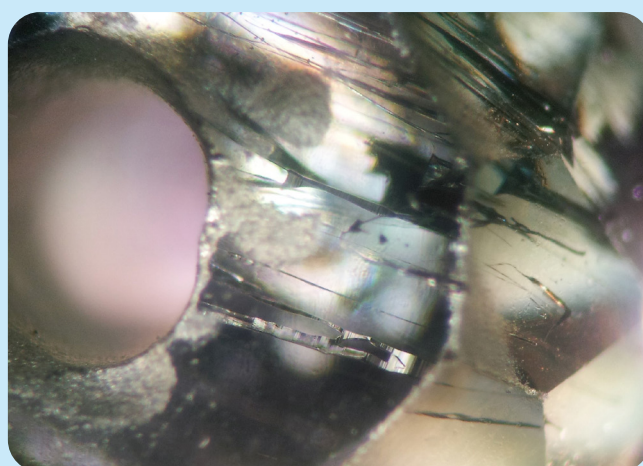


Figure 10: Ribbon like inclusion in synthetic moissanite. Notice the grooves on the surface of the ribbon-like inclusion.

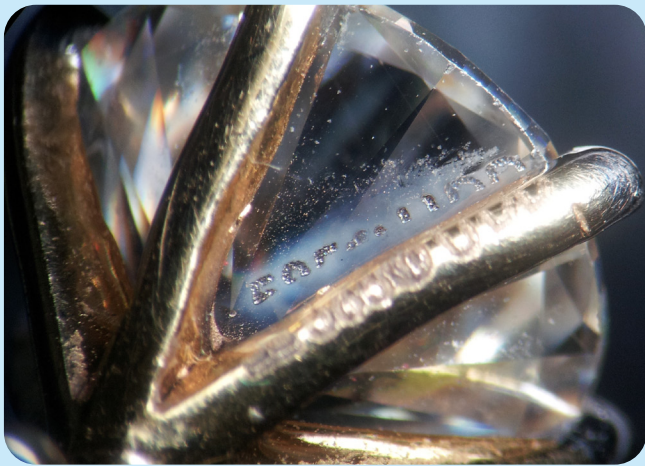


Figure 11: A mounted synthetic moissanite laser inscribed by mistake on its surface.



Figure 12: A round brilliant cut black moissanite weighing 32.16 carats.



Figure 13: Sub parallel ribbon-like inclusion and stringers. Notice the doubling of the back facet edges is not visible through the table although the ribbons are almost parallel to the table. This proves that these ribbon-like inclusion can be formed in synthetic moissanite unrelated to its optic axis direction.

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MICHAEL D. COWING is the author of *Objective Diamond Clarity Grading*, an educator, gemologist and appraiser operating an Accredited Gemologist Association (AGA) Certified Gem Laboratory. His career in the diamond, gem and jewelry business spans over 35 years.



CZ Master Stones: A Blessing or a Curse?

Editors Note:

One of the first questions a publication will ask you when you submit an article is if it has been published before. If the answer is 'Yes', the publication will invariably decline the article.

As the editor of *Gemmology Today*, I understand the logic from a publishing perspective. Being the 'first' to publish an article is the 'Nirvana' of all publishers but is this necessarily in the best interests of the person who spent time researching the article and writing it? More importantly is this in the best interests of the industry those publications represent?

The goal of *Gemmology Today* is get as 'much information as possible' into 'as many hands as possible'. To make our industry better, stronger, more credible, more knowledgeable and by default more professional. Disseminating information, whether it is an older article that needs to be dusted off and revisited or a new article is irrelevant. What is 'relevant' is how 'relevant' the article is to our industry.

The other day I was chatting with Michael Cowing. If you have never met Michael, you should because he is passionate about diamonds and more importantly about how we can improve all aspects of diamond grading. We were talking about possible future articles and he mentioned an article that was published in the *Journal of Gemmology* 2008, Volume 31 No. 3/4. He had written the article to present the results of a study he and others had made regarding the reliability of cubic zirconia master stones. The results were eye opening to say the least. As you will see all is not what it seems when you compare cubic zirconia master sets from different manufacturers against GIA master diamond sets.

Currently there is a 45% difference in price between a D colour, VVS-1 diamond and an F colour, VVS-1, a 28% difference in price between a D colour, VS-1 and an F colour, VS-1 and an 8% difference in price between a D colour, SI-1 and an F colour, SI-1. Frankly it matters little about the huge disparity in prices, what really matters is that many of you may be using a 'tool' that is completely inaccurate and this means that every colour grade you assign is wrong.

If you look at the results at the end of the article you will see that the 'E & G' masters of CZ Master Set A-1 are both 'E's'. This means that a person using this set could potentially assign a 'G' colour grade to an 'E' colour diamond.

The ramifications of this are enormous. Firstly it will have a huge impact on the value. Secondly the owner of an actual 'E' colour diamond would receive a 'G' colour diamond in the event the diamond was lost and stolen. Thirdly if the diamond is sold using a document prepared using this master set, the buyer will receive a diamond that is of a much higher colour and value while paying considerably less than they should have done.

Sadly many people place 'blind faith' in the tools they use. This is evident with 'Diamond Testers' where users rely solely on instrumentation, making important decisions that could have serious financial implications.

This is precisely why we are publishing this article and why we have asked Michael to revisit this study to see if things are better or worse. While it only involves the random testing of two sets, one from each manufacturer, it was interesting to see the results that are included as in the addendum at the end of the article.

For and against using CZ master stones for colour grading

With all the vigilance needed in the use of diamond colour master stones, what are the pros and cons in the use of CZs as masters?

A sidebar from GIA's Diamond Grading Course (GIA, 1994), titled 'No CZ for D-Z' makes it clear that GIA writers and educators have advised against the use of CZs as master stones for colour grading. The reasons given are the different yellow hue, confusing reflections from CZ's greater dispersion, the difference in lustre, and the concern over CZ's colour stability. Any case made for the use of CZ masters has to address these concerns.

Large laboratories such as those of the GIA and the AGS have multiple sets of GIA-graded diamond master stones for colour grading. Small laboratories, such as the author's AGA Certified Gem Laboratory, and gemmologist- appraisers, who have obtained AGS's Independent Certified Gemmologist Appraiser (ICGA) designation, are required to grade with at least a five-diamond master set. However, many gemmologist-appraisers, the author included, feel it is necessary to use a complete set comprising each of the most important whole letter grades from E to L or lower.

A sample of 38 gemmologist-appraisers listing their colour grading equipment on the Internet revealed that 16 listed a combination of diamond and CZ master stones, seven listed only CZ, and 15 listed only diamond.

This small sample indicates that many gemmologist-appraisers have found a place for CZ in master stone sets. Many jewellers and others in the industry have employed CZ masters since they became available over 23 years ago.

The appeal of CZ Masters is an economic one. Because of the poor economy of tying up large amounts of money in larger diamonds, most master stone sets consist of quarter to third carat sizes of four or more diamonds. Without a master diamond for each grade, visual interpolation or extrapolation is required, which increases the subjectivity of colour grading. In addition, disparity in size makes precise comparison of colour more difficult, and comparing the colour of a small quarter or third carat diamond master to a carat or greater size diamond requires considerable skill only obtained through practice and experience.

Both James Naughter GG FGA of A&A Gemological Laboratory (pers. comm.) and Howard Rubin GG of Gem Dialogue Systems (pers. comm.) relate that they can much more effectively arrive at a colour grade of a carat or greater size diamond using carat size CZ masters than by using the smaller and fewer stones of their diamond master sets. They and others find that a more accurate grade can be obtained with a 10 stone master set of carat size CZs than can be obtained with a small, incomplete set of diamond masters.

Al Gilbertson (pers. comm.), one of the two original AGS, ICGA appraisers with over thirty years experience, states that when on appraisal assignment outside the laboratory, he would take on the road with him a set of CZs that he had checked periodically for accuracy against his diamond master stone set. His diamond masters remained in his laboratory, while he risked only the loss of the relatively inexpensive CZ masters. He would compare his CZ masters once or twice a week against diamonds graded by GIA to develop familiarity and skill in their use. Gilbertson's point was not to shun the use of CZs, but to be practised in their use when the need arose. Periodic practice and checking of CZs raises proficiency in their use and would reveal any possible colour change.

The laboratory of David Atlas GG, President of D. Atlas & Co. Inc. (pers. comm.), employed several sets of CZ master stones in their colour grading and GIA-graded diamond master stones were used to check frequently for any colour change in the CZs.

Several diamond wholesale dealers known to the author use CZ master sets in their buying. The often-narrow margins in their wholesale transactions mean that a one-grade mistake in colour grading can make the difference between profit and loss. Their success in the practical use of CZs in diamond buying and colour grading is testimony to the accuracy, and usefulness of their CZ masters.

For many, CZs have become a recognized and accepted tool in diamond colour grading. All these examples support the usefulness of CZ masters in the colour grading of diamonds.



Diamonds Viewed Table Down

Considerations specific to the use of CZ in colour grading

For those who currently use or who are contemplating using CZs for colour grading diamonds, there are a few factors to consider in addition to the guidelines listed for GIA diamond master stones.

Of foremost importance is having a CZ master stone set that is accurately graded against a full, reference GIA diamond master set. The CZs should correspond in tone and saturation and be close in hue to their diamond master set equivalents. The biggest problem is the accuracy and evenness of colour spacing of these master sets. After all, the GIA master diamonds are a 'second generation' having been graded against the 'master master primary set'. The CZ master sets are third generation stones incorporating possible accumulated (or cancelled) errors of two graders.

A revealing test of initial accuracy and evenness of spacing of a ten stone master set of either diamond or CZ is to mix them up, and by eye try to put them back in order of increasing colour. Assuming normal colour vision, if your 'placing' results in the set being out of order, it is the set that is the problem.

In considering the hue differences between CZs used as masters and the yellow tints in type 1a, Cape series diamonds, these are small and not nearly as difficult as comparing the tone/ saturation of a pale grey or pale brown diamond with the pale yellow, Cape series, master diamonds. The author and those interviewed for this article found little difficulty comparing the colour of yellow cape series diamonds to the yellow hue of CZ masters.

Addressing the concern for the colour stability of CZ, the experience of the author and of other owners and CZ-master manufacturers is that the type of CZ material used by the two main suppliers, one for over 22 years, has proved to be largely stable under normal care and use.

The differing absorption spectra of diamonds and CZ raises concern for possible colour shifts (called metameric failure) in different illumination environments. A way to avoid this possibility is by grading (and periodic checking and recalibrating against diamond masters) under lighting similar to illumination the manufacturer of the CZ set recommends and uses in his initial grading. Experiments by this investigator, grading in five different lighting environments, yielded the same colour grading determinations. This finding reduces the concern for possible colour shifts, as there was no apparent metameric failure. Relative to the diamond masters, no colour shifts of the CZs were observed.

Evaluation of CZ master stone sets

To provide a preliminary assessment of currently available CZ master stone sets, a number were obtained from several different vendors of gemmological equipment. All these

suppliers carry CZ sets from either or both of two sources, designated A and B in this study. Purchased were eight, 10 stone sets, four from each manufacturer. The purpose was to evaluate the accuracy of the sets.

This investigator graded each set against a background of accordion folded flat white paper with his complete diamond master set. To check for any possible colour shift in different lighting due to CZ's different absorption spectrum and varying small amounts of yellow fluorescence, the grading was done for each stone in five different lighting environments. These were a daylight fluorescent, a daylight fluorescent through a lexan plastic filter to remove UV, a cool white fluorescent, a 'full spectrum' fluorescent, and a white LED lamp.

Using all five lighting environments, the author found the same colour determination in each of these illuminations. This established that CZ's different absorption spectrum and varying amounts of fluorescence did not result in colour changes (metameric failure) large enough to cause additional error in colour grading.

Experimenting with these five different lighting environments resulted in the surprising finding that colour differences were more apparent and colour comparisons were more easily made in cool white and 'full spectrum' fluorescent lighting (colour temperatures from 4200K to 5500K). Colour differences of a grade or less were more difficult to see and evaluate in the slightly bluish-white daylight fluorescent and the LED lighting (colour temperatures 6500K and above). This finding is interesting, because, on one hand, it is at odds with the widespread prescription for north daylight equivalent (6500K) lighting (Bruton, 1978), while on the other hand, it supports GIA's Diamond Course (GIA, 1994) statement: 'Filtered, cool white, balanced fluorescent light is best.' The author suggests trying both to find a personal preference.

The B master sets contained the master stones D through L and N, while the A sets contained the stones E through N. The sets were evaluated as a 10 stone whole, and then re-scored for the more important eight grades E through L, which both sets have in common.

The author graded all eight sets, and David Atlas and James Naughter graded four sets apiece, two from each manufacturer, and the results are given in Table I. It is important to acknowledge that the errors measured are a combination of errors in the manufacturers' gradings, differences between our three master stone sets, and any errors in grading by the three of us.

The author had the advantage of a full set of diamond master colour grades, while James Naughter used a GIA and AGS graded five diamond master set, and David Atlas used a full set of CZs graded against diamond masters and including a GIA H master diamond. On any given stone, our errors

may increase or decrease the true manufacturer error adding uncertainty to this measure. However, the results, including the total average error in comparing the group of four sets from each manufacturer, do indicate a sufficiently accurate evaluation that shows the relative accuracy and consistency of the sets from each.

Two measures of error were used to evaluate the eight CZ master sets, the second being twice as demanding as the first. The first measure is normal colour grading, meaning the determination whether each CZ is within or at the top of its grade. This measure scores each CZ as either 'zero error' if a stone is within or at the top of its stated grade or, if outside the grade, the number of grades it is off.

This first error measure, which determines how close the CZs were to their labeled grades, finds that the A sets have an average per stone error, over the most important eight grades, of 1.36 grades (scoring of author, MC) and 0.88 grades (scoring of David Atlas, DA and James Naughter, JN). In comparison, the B sets have an average per stone error of 0.09 grades (MC) and 0.13 grades (DA and JN).

The second and more critical error measure, which determines how close the CZs were to the diamond master stones they represent, finds that the A sets have an average per stone error over the most important 8 grades of 1.16 grades (MC) and 0.80 grades (DA and JN). In comparison, the B sets have an average per stone error of 0.19 grades (MC) and 0.38 grades (DA and JN).

On the basis of this survey therefore, the B sets are the more accurate. In addition to having higher accuracy, the B sets also have the more even spacing between the grades. Due to this even spacing, no two grades were too close and it was possible to scramble the B sets and, by eye, put them back in correct order.

Having said this, it is important to state that this survey was carried out on only a small sample of sets purchased in 2008, whose dates of assembly are not known. It may be, for example, that the A and B sets were assembled at different times. The implications of this survey for sets in the future are not quantifiable by the author.

Conclusions

The main benefits of this study are in showing the practical use of accurately graded CZ master stone sets, and the factors and methodology in their proper use, and demonstrating the importance of verifying the initial accuracy of the set, as well as making periodic checks against full, diamond master colour grading sets to insure retention of that accuracy.

Interested gemmologist-appraisers are encouraged to explore for themselves why CZ masters have found a place in the colour grading of diamonds. This investigation finds that CZ masters have a contribution to make in reducing the subjectivity of diamond colour grading when, as is frequently the case, the available diamond masters are relatively small in number and/or size. The study findings and results also support the argument that an accurate and complete set of CZ masters can, by themselves, be effectively employed in diamond colour grading, if periodically checked for retention of that accuracy.

Acknowledgements

Thanks to the following individuals for their contributions, discussions, and suggestions: David Atlas, Al Gilbertson, Raymond Mason, James Naughter, Howard Rubin and Peter Yantzer, and special thanks to Richard Cartier for suggestions and assistance with organization and editing.

Set	Grader	D	E	F	G	H	I	J	K	L	M	N
A-1	MC	-	Hi E	E/F	E	F/G	Hi I	Hi J	H/I	I (<J)	K	N
	DA	-	D	E	F	G	H	I	J	K	M	O/P
A-2	MC	-	Hi D	D	E	F/G	F	H/I	Hi K	K	L	L/M
	JN	-	Hi D	D	Hi H	I	Hi J	K	Hi L	L	Lo L	M
A-3	MC	-	D	Hi D	E	Hi F	Hi GD	Hi I	K	Lo K	K	O
	DA	-	E	E	F	G	H/I	J	L/M	M	N	O/P
A-4	MC	-	Hi D	Hi D	Hi F	Hi G	Hi G	K	K	Lo K	M	L/M
	JN	-	Hi D	Lo D	Lo E	Lo G	Hi H	J	K	Hi L	N	N/O
B-1	MC	D	E	Hi F	G	Hi H	Hi I	Hi J	K	Hi L	-	N
	DA	D	E	F	F/G	H	I	J	K	L/M	-	O
B-3	MC	D	E	E	F/G	G/H	H/I	Hi J	Hi K	Hi L	-	N
	DA	D	E	E	G	H	I	J	K	L/M	-	N/O
B-5	MC	D	E	Hi F	Hi G	H	Hi I	Hi J	Hi K	K	-	M
	JN	Hi D	Hi E	Hi F	Hi G	Hi H	Hi I	Hi J	Hi K	Hi M	-	N
B-7	MC	D	E	F/G	F/G	Hi H	Hi I	I	K	L	-	O
	JN	Hi D	Hi E	F/G	F/G	Hi H	Hi I	Lo I	Lo K	M	-	N

Table I: Results of grading by D. Atlas (DA), M. Cowing (MC) and J. Naughter (JN) of four A and four B CZ master stone sets.

Set A					
Set	Grader	10 Error Average	Worst Error in 10	8 Error Average	Worst Error in 8
A-1	MC	1.25	2.5	1.31	2.5
	DA	0.95	1.5	1	1
A-2	MC	1.45	3	1.5	3
	JN	1	1	1	1
A-3	MC	1.5	3	1.5	3
	DA	0.85	2	0.75	2
A-4	MC	1.05	2	1.13	2
	JN	0.8	1.5	0.75	1.5
Average	MC	1.31	3	1.36	3
	DA & JN	0.9	2	0.88	2

Set B					
Set	Grader	10 Error Average	Worst Error in 10	8 Error Average	Worst Error in 8
B-1	MC	0	0	0	0
	DA	0.1	1	0	0
B-3	MC	0.1	1	0.13	1
	DA	0.1	1	0.13	1
B-5	MC	0.2	1	0.13	1
	JN	0.1	1	0.13	1
B-7	MC	0.2	1	0.13	1
	JN	0.2	1	0.25	1
Average	MC	0.13	1	0.09	1
	DA & JN	0.13	1	0.13	1

Table II: Closeness of CZs to their labeled grades; errors measured in units and decimal points of one grade.

Set A					
Set	Grader	10 Error Average	Worst Error in 10	8 Error Average	Worst Error in 8
A-1	MC	1	2.5	1	2.5
	DA	0.65	2.0	0.5	0.5
A-2	MC	1.05	2.5	1.13	2.5
	JN	1.2	1.5	1.25	1.5
A-3	MC	1.28	2	1.23	2
	DA	0.95	2	0.75	2
A-4	MC	1.18	2	1.29	2
	JN	0.71	1.5	0.7	1.2
Average	MC	1.13	2.5	1.16	2.5
	DA & JN	0.88	2	0.8	2

Set B					
Set	Grader	10 Error Average	Worst Error in 10	8 Error Average	Worst Error in 8
B-1	MC	0.25	0.5	0.19	0.5
	DA	0.6	1.5	0.5	1
B-3	MC	0.2	0.5	0.13	0.5
	DA	0.6	1	0.56	0.5
B-5	MC	0.25	0.5	0.19	0.5
	JN	0.1	1	0.13	1
B-7	MC	0.4	1.5	0.25	0.5
	JN	0.32	1.5	0.34	1.5
Average	MC	0.28	1.5	0.19	0.5
	DA & JN	0.41	1.5	0.38	1.5

Table III: Closeness of CZs to their equivalent diamond master stones; errors measured in units and decimal points of one grade

Editors Note:

While we certainly acknowledge that testing two random CZ master sets from each of the manufacturers involved in the initial study does not constitute a 'formal' study, it does allow us to see if a problem still exists.

Yes it can be argued that the one set tested may not be indicative of all the other sets but at the same token, it can also be argued that five sets have now been tested from each manufacturer and the results are the same.

Here is what Michael found when he revisited this subject nine years later.

Addendum

Measured from the upper boundary of each master grade, the set from Producer A had an average error over the eight grades (E to L) in common with both sets of 1.81 grades with the worst-case error of 2.5 grades. Measured from the center of each grade, Set A had an average error of 1.21 grades with a worst-case error of 2.5 grades.

Measured by closeness to the master grade, the set from Producer B had an average error over the eight grades (E to L) of 0.63 grades with the worst-case error of 1 grade. Measured from the center of each grade, Set B had an average error of 0.125 grades with a worst-case error of .5 grades. This set has great accuracy when viewed and used as split grade masters (stones within a quarter grade of the letter grade's center rather than its upper boundary.)

The grading of these two sets supports the 2008 study findings and again demonstrates the impracticability of using CZ master sets from Supplier A to assign accurate color grades while re-affirming that the CZ master sets from Supplier B are far superior and far more accurate.

Additionally, a new problem emerged with the CZ material used in six of the stones from Supplier A. Rather than the yellowish hues of most of the original CZ material used by both manufacturers, the color grades E through J were of grey hues, which were very difficult to grade using the usual cape-series yellowish diamond masters. This was one more obstacle to the use of this set.

Fluorescence analysis discovered that both producers have begun sprinkling less expensive material from China into their sets, with stones exhibiting varying amounts of red fluorescence. While the original material, which fluoresces varying strengths of yellow, has proven stable over decades of use, the color stability of this new material remains to be determined.

The 2008 study found that CZ's differing absorption spectra and varying amounts of fluorescence did not result in colour changes in different lighting (metameric failure) that were large enough to cause additional error in colour grading. This appears to be true of the newer red fluorescent material as well. To be on the safe side, the author suggests a solution to ensure against any colour change due to the variable fluorescence of the CZ's caused by the varying amounts of UV in different lighting. This involves the use of an inexpensive clear or white polycarbonate filter to remove any UV, thus preventing fluorescence stimulation. Brands of polycarbonate, which filter out UV below 400nm, such as Lexan and Makrolon, are readily available in small sizes on eBay and elsewhere for under \$10. If LED illumination is used in grading, no filter is necessary, as white LED lighting contains no UV.

Editor's Note:

It would seem prudent when buying any CZ Master set that you firstly check their accuracy against known diamonds of various colour grades. Secondly that you check all the cubic zirconia under UV light to determine if they exhibit red or strong orange fluorescence. Clearly using CZ master stones that have strong fluorescence under a light source that stimulates UV (without using a polycarbonate filter) is going to affect the accuracy of the colour grades you assign.

It is also important to remember that you could be held accountable for any errors you make and while it would be very simple to blame this on the 'tools' you are using, ultimately the responsibility lies with the end user to ensure that these 'tools' produce accurate results. After all, the credibility of our industry affects us all and it is beholden on all of us to do whatever we can to protect it.

Obviously this article raises some serious questions. How widespread is this problem? It's really hard to tell but if you have purchased a CZ Master set and have experienced problems with it, we would love to hear from you, who you purchased the set from and any supporting documentation that confirms the problems you have encountered.

Sole Leone

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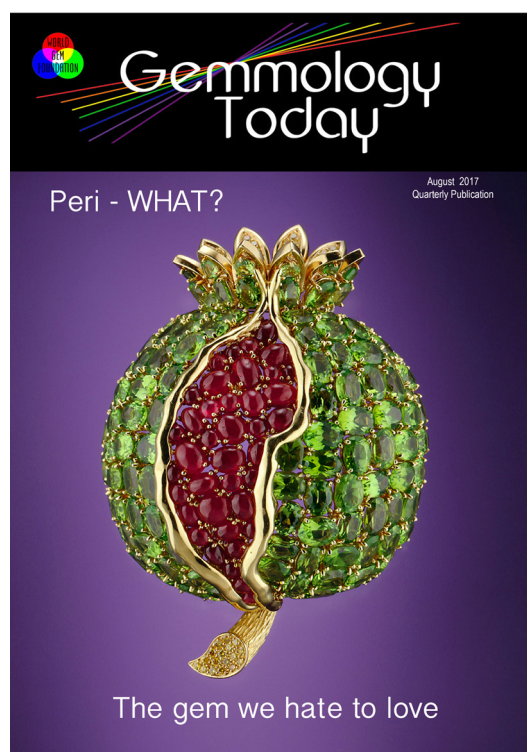
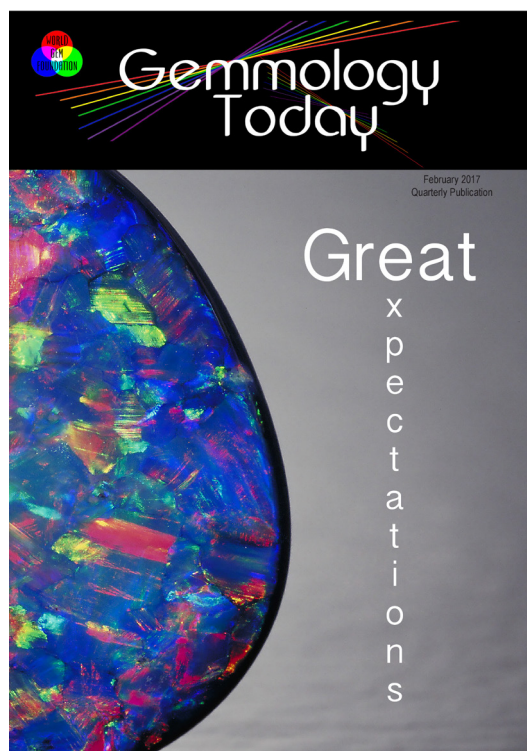
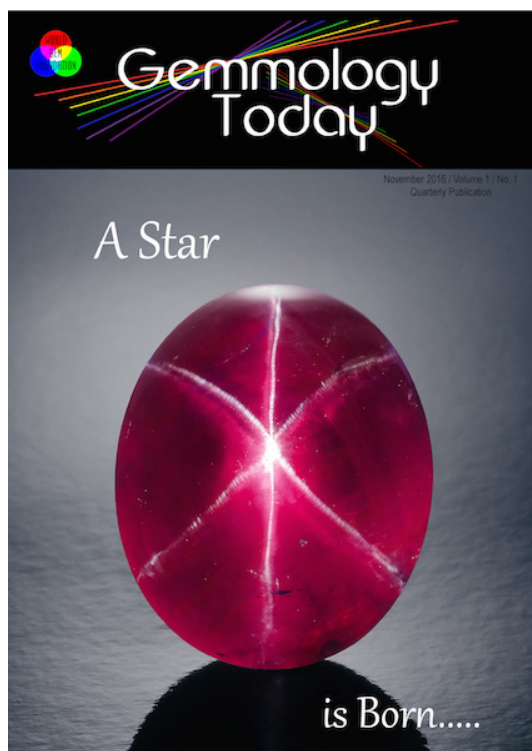


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Reasons Simple Gem-Testing Tools Remain Important... And Why You Should Be Using Them Regularly

(Not Necessarily For The Reasons You Might Think)!

Editor's Note:

This is the first of four articles where Antoinette explores everyday tools available to gemmologists and how to truly push their limitations to achieve maximum mileage.

There are many troublesome gemstones in today's market - including synthetic diamonds (made by both CVD and HPHT methods), new colored gemstone synthetics, tanzanite imitations, and glass-infused corundum imitating ruby and sapphire in various colors. But this is nothing new: the field of gemology is always changing!

Nonetheless, such products are creating confusion and increasing risks for retailers, designers, bench jewelers, and appraisers because of the quantity of 'questionable' stones now in the market. Making matters worse is that detection of some of these materials requires sophisticated, costly instrumentation that few independent gemologists and appraisers can afford to acquire.

This is discouraging to many gemologists, but worse, such a situation does not bode well for the trade or the public. As my late father (Antonio Bonanno) always said, 'if it's good for the public it's good for the trade; if it's bad for the public it's bad for the trade'...and experience has shown me how right he was! Unfortunately, for whatever reasons, a lot of what is now circulating in the gem and jewelry field is being erroneously identified or deliberately misrepresented, which is not 'good' for anyone, including the trade itself. This is the bad news.

Now for some good news. A lot of the fear and anxiety felt today results from the continuing insistence that very costly, sophisticated instrumentation is necessary to accurately identify all of the materials now in the marketplace, causing many gemologists (and others) to feel overwhelmed, even obsolete. But in reality, while this may be true for some of the gemstones now in the market, most gemologists have all

they need to identify most of what they see, and, equally important, to recognize which materials actually do need to be sent to a major laboratory with equipment they may lack in their own labs. In short, gemologists are far from obsolete!

Let's take a look at some of the most useful tools that are often overlooked today, all of which are very affordable and can be easily carried with you. They can also be useful not only at gem and jewelry shows, but also in the field! If you know (or remember) how to use them correctly, and recognize the need not to rely on any one tool alone (but to use several in order to put together multiple clues), you will often discover you have enough data to identify what you have, or perhaps equally important, to know what you don't have. At worst, they can provide enough information to know whether or not the piece will need to be sent to one of the major laboratories with sophisticated instrumentation in order to know exactly what it is.

So what are the tools needed?

Here I will share with you what I've learned from my own experience over the years. Personally, I never go to any gem or jewelry show without the following:

- Chelsea Filter
- Hanneman-Hodgkinson Synthetic Emerald Filter (when looking at any emerald that shows a red reaction through the Chelsea Filter)
- Calcite Dichroscope
- 10x Loupe
- Portable Long-wave/Short-wave UV lamp (that provides long-wave and short-wave radiation)
- SSEF Diamond Type Spotter (for diamonds only).

I also carry my own flashlight to ensure I have a strong incandescent light source if not available where I'm examining stones (an incandescent light source can be sunlight or a flashlight that emits warmth when you hold it over your skin).

These tools are always immediately accessible in my jacket pocket. And they will tell you more than you might imagine, but only if you actually use them, preferably at the counter, and preferably before you make any purchase!

Seriously, the most difficult obstacle to overcome, especially if you're a relative newcomer to the field, is actually using tools to examine stones in front of a seller. But you'll come to realize that when you do, in addition to what they will tell you about the stone(s) you're examining, one of the most interesting discoveries you may make simply by pulling them out of your pocket and beginning to examine a stone with them, is what they may tell you about the seller of the goods you're examining.

In this issue we are going to start by exploring the many uses of a Chelsea Filter, and why it's time to re-establish its value in today's market. When you know how to use it, it plays an important role where the most popular gemstones, and some of the most costly, are concerned.

The Chelsea Filter is a color filter used to examine colored gemstones only. It only allows two wavelengths of light to be transmitted through it, so whatever colored gemstone you're examining, you'll see only shades of red/pink or shades of green, or in the case of a very dark stone, the stone may appear blackish. Any gem having trace elements of chromium or cobalt will normally show a reddish or pinkish reaction when viewed with the Chelsea Filter (unless, as I discuss later, there is sufficient iron present to block the reaction).

So let's discuss what you need to know about the Chelsea filter.

Rule #1: Learn what color a specific gemstone is supposed to show when viewed through a Chelsea Filter.

Gemology textbooks usually discuss the Chelsea Filter, when it should be used, and what colors you should see for the variety of gemstone materials so I won't list them all here. But in addition to what is listed in most gemology textbooks, as you will see later in this article, the Chelsea Filter can provide important information for virtually every colored gemstone. But let's start with some of the stones listed in most books on gemology.

In short, if you know a stone is supposed to show a specific color when viewed through the Chelsea Filter, and the stone does not show that color, you will know what you do **NOT** have (which can be valuable in and of itself). Then you'll need to use other tools to know what you **DO** have. One of my clients learned this when she brought me an antique piece she wanted to remount.

The Case of the Mystery Blue Stone

Many years ago I was shown a very lovely antique, 15 karat yellow gold brooch, with a border of natural seed pearls encircling a blue 'aquamarine' at the center of the brooch. The owner wanted to remove the aquamarine to make a more contemporary piece of jewelry because she had inherited the brooch and it just was not her style.

The first thing I did was look at the 'aquamarine' through the Chelsea Filter to confirm its identity. Knowing that aquamarine never shows a reddish reaction, you can imagine my surprise when that's exactly what I saw – a reddish reaction rather than the greenish reaction I was expecting. I was all the more surprised since it was an antique piece that predated what I now suspected the stone to be, and the workmanship was very lovely, as was the quality of the seed pearls. Who would have suspected the 'aquamarine' centerpiece would be an imitation! But in this case, the red reaction through the Chelsea Filter told me it was definitely not an aquamarine, as its owner believed, nor did I think it was blue topaz given the specific hue and knowing that blue topaz in such a lovely 'aquamarine color' also doesn't show a red reaction. Additional testing showed it to be synthetic spinel, which wasn't even being produced when the brooch was made, so something else had clearly been the centerpiece originally. We'll never know what it was, or why there was now a synthetic spinel at the center, but the older I get, the more I appreciate my Dad's sage observation: 'the older the piece, the less likely it is to be what the owner believes it to be'! And here was yet another example!

In this case the Chelsea Filter told me immediately what it was not and that additional testing was needed to know exactly what it was (which was easily done with two other pocket tools, that we'll discuss in the next issue of *Gemmology Today*).

Speaking of blue topaz, and the fact that most blue topaz also does not have a red reaction when viewed with the Chelsea Filter, I must also mention another experience I had with a Chelsea Filter, to underscore the importance of always using more than one tool to identify any gem material.

About 30 years ago, I did, in fact, see a 'blue topaz' that showed a strange 'reddish' reaction through the Chelsea Filter, a color I'd never seen before, nor since. I was certain it was not a blue topaz because of the reaction to the Chelsea Filter, but the owner insisted it was. So I then used a couple of other tools that also failed to show what I should have seen for aquamarine. Finally, I tested it with a refractometer and was quite surprised to get a reading confirming that it was a topaz! I've never seen another like it in all the years I've been in the field. In retrospect, I should have tried to buy it from the owner, or at least asked if she

might have loaned it to me to take to my father's laboratory to see if he could ascertain why it showed such a strange reddish reaction under the Chelsea Filter. In recent years I've often wondered if it was the result of early experimentation with surface coating or some type of fracture filling. If I ever see one again, I'll buy it and do some additional testing, including 'destructive testing' if necessary!

And by the way, for those of you who are relatively new to the field, there **IS** naturally occurring, natural-color, blue topaz; one of my favorite gemstones. It is actually very rare and used to be very desirable, but unfortunately, treated blue topaz has now flooded the market and the techniques needed to distinguish natural topaz from treated topaz are too costly relative to the cost of the material itself, so it is all lumped together today and 'assumed' to be treated.

Rule #2: If multiple stones of the same hue (color) and tone (how light/dark they are) are the same gemstone material, whatever color is seen through the Chelsea Filter should be the same for all the stones. If not, the stones are not 'the same'!

The Case of the Chrome Tourmaline Mix-up

I'll never forget an experience I had a number of years ago, at an international gem show, at which I had pulled out my Chelsea Filter to look at some chrome tourmalines on display in a dealer's showcase. I knew that chrome tourmaline **ALWAYS** shows a reddish reaction when viewed through it – and I quickly noticed that while most of the 'chrome tourmalines' in his case showed a strong red reaction through the filter, two of the stones did not! Having used only a Chelsea Filter at this point, I knew only that something was wrong, but I knew this immediately! I didn't yet know for sure if the stones in his case were even tourmalines, but I did know immediately that two of the stones were **NOT** 'chrome' tourmaline.

Chrome tourmaline has a unique and highly desirable hue that results from the presence of the trace element, chromium; it is also much rarer than the 'verdelite' variety, so it is also much more costly - the difference in cost at the time was approximately \$40 to \$50 per carat for Verdelite, in stones



Chrome Green Tourmaline (1.24cts)
cut by John Dyer (Photo by David Dyer)

weighing approximately 4 to 5 carats, versus \$400 per carat for a chrome tourmaline of comparable weight and quality! And it is the presence of the chromium that causes a red reaction when viewed through the Chelsea Filter. Seeing 'no red' indicated the stones could not be chrome tourmaline. Period.

So my next step was to ask the dealer to let me see one of the stones that showed a red reaction, and one that did not, in an effort to confirm what the stones were (using my dichroscope and loupe as my next steps).

I was stunned, literally, by his reaction: he told me explicitly to 'move along' because he didn't have the 'time to deal with people who [didn't] know what they're doing'! After overcoming my initial reaction, my second reaction was that he was a dishonest dealer trying to intimidate me so I'd move on to another booth. But I couldn't just move on. So I asked him how he could say such a thing, and he immediately pointed out that anyone who still used a Chelsea Filter didn't have a clue what they were doing and he didn't have time to deal with fools...adding condescendingly that the 'green stones' I was looking at were not emeralds but were, as marked, 'chrome tourmaline'.

It was now his turn to be surprised; I explained that if he thought that a Chelsea Filter was only useful for emeralds then he was the fool, pointing out that two of the 'chrome tourmalines' in his case were definitely not what he was representing them to be, since all chrome tourmalines show a red reaction through the Chelsea Filter.

Now he genuinely looked shocked and took the filter from my hand and looked for himself. He immediately changed his tone, explaining he'd never even thought to use a Chelsea Filter for tourmaline, and added that he'd just 'learned something' and that what I said made perfect sense. We then tested all of his chrome tourmaline with a refractometer, and they were all tourmaline, just not the more costly 'chrome tourmaline'!

So he then took an interest in hearing all the ways I used a Chelsea Filter - and then I showed him what he could do with a Chelsea Filter combined with the additional 'clues' provided by also using a calcite dichroscope and loupe, as I proceeded to accurately identify every green gem he showed me from the inventory he had with him. Not only did he thank me, but we also became good friends from that time until today, and all because I used my Chelsea Filter and saw something I knew I shouldn't see.

Over the years I've learned not to take anyone's word for anything pertaining to what they're selling. I also have enough experience to know that, regardless of the knowledge, experience, and integrity of the source, people can make mistakes. Sometimes stones get mixed in with other stones accidentally. The most experienced and

reliable gemstone dealers, lapidaries, and manufacturers also understand this and have no problem with buyers examining stones with whatever tools they'd like to use. In the rare experiences where something is questionable and turns out not to be as represented, or where something which turns out to be unusual in some respect, everyone learns something and everyone benefits!

The Chelsea Filter is often the fastest way to confirm whether or not all of the stones in a parcel or a multi-stone piece of jewelry are, in fact, the same material. You don't even need to know what color you're supposed to see. If multiple stones of the same hue and tone are the same material, whatever color you see when viewing the stones through the Chelsea Filter should be the same. If there are some slight variations in the tone, you might see slightly lighter or deeper shades of color when viewing them through the filter, but not different hues. This was exactly what happened in the case of the chrome tourmalines. But it is useful for stones in every color, even those that never show a 'reddish reaction' when viewed through the filter. So this is rule #3.

Rule #3: Note what you see precisely, whether or not you see red...sometimes when you 'don't see red' you are still seeing a different color or shade of color... one that should make you see red!

When you know what color a gemstone is supposed to appear when viewed through a Chelsea Filter, and the stone being viewed does **NOT** show that color, you know something is wrong. But unfortunately, many basic gemology books indicate that if a stone does not show 'red' or 'pink' that it is 'inert' to the Chelsea Filter, when this absolutely is not the case.

Where a Chelsea Filter is concerned, a subtle difference in the exact 'hue' constitutes a 'different' color. So don't look simply for whether or not you see red. Look more closely at the distinctively different shades of color you might see. This may be difficult when looking at a single stone, but it is invaluable when looking at parcels of stones or an item of jewelry that contains multiple stones that are supposed to be the same, as these examples demonstrate:

The Case of the Paraíba Tourmalines that were NOT Paraíba Tourmaline!

I was at a show and saw a small tray containing what were described as 'Paraíba tourmaline.' There were four stones in the tray, approximately one carat each, in varying shapes and sizes. They all had that lovely color that has come to be associated with Paraíba tourmaline – a gorgeous blue with a very slight greenish undertone, resembling the color of 'Windex' window cleaner - although they were of slightly different hues and tones. However, when examining them carefully I noted their 'personalities' weren't quite the same, and I became a little suspicious, so I pulled out my Chelsea Filter, knowing that if they were all Paraíba tourmaline, I'd see essentially the same color reaction through the filter (possibly slightly lighter

or darker shades of whatever I was seeing since there were slight differences in tone). Instead, what I saw was that one stone appeared red (so I knew that stone was not a Paraíba tourmaline, and possibly not tourmaline at all). But what about the remaining three?

Of the remaining three, only two showed the same reaction, a greenish color, but distinctly different from the grayish-greenish color shown by the third stone. Thus, I knew there were three different materials in the tray, and only two of the four stones were 'the same stone'! With additional testing I learned that the one that showed a strong red color through the filter was a 'Paraíba-color YAG', one stone was a Paraíba-color apatite, and the remaining two stones that showed the 'same' color were, in fact, Paraíba tourmalines.

Needless to say, if anyone had purchased all four stones, at the price being asked - a price that was appropriate only if all four stones had been Paraíba tourmaline - they'd have suffered a significant financial loss. Worse still, if they had sold all four stones as Paraíba tourmaline, and any of the buyers ever found out that the stone(s) they bought were not Paraíba tourmaline, the reputation of the seller who bought them, even unknowingly, would have been irreparably damaged!

The Case of the Aquamarine Beads

I was looking at some lovely beads represented as aquamarine. Before buying them, I pulled out my Chelsea Filter and was surprised to see the stones showed distinctly different reactions through the filter. None appeared red, but the greenish color was not the same hue of green. I also noticed that there were significantly more beads in one shade than in the other so I used my refractometer to obtain an R.I. for each bead. This confirmed that the beads contained a mixture of aquamarine and blue topaz. I doubt it will surprise you to learn that there were far more blue topaz than aquamarine in the strands. In this case, I think the dealer was more surprised than I was, and given the price of the strands, I also suspect he bought them from his source believing them to be aquamarine. He too is also now a believer in the value of the Chelsea Filter!

Rule # 4: The deeper the color of the stone, the deeper the color seen through the Chelsea Filter should be...or you may have a composite.

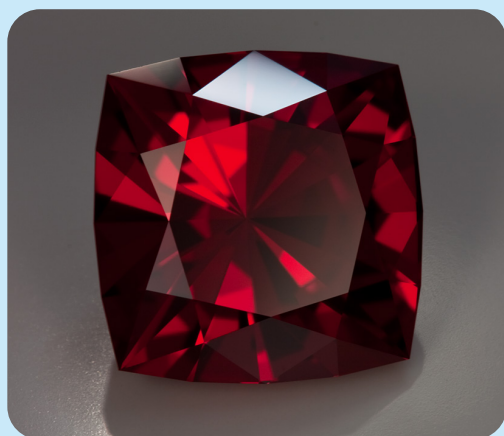
Few textbooks discuss this important point, but the value of knowing this cannot be over-stated. Its value is best illustrated if we take a look at a costly deep green Colombian emerald. The color one expects to see through the filter is a rich, deep red. Conversely, when viewing a Colombian emerald that is a much lighter, pastel green color, the color we'd expect to see through the Chelsea Filter is much pinkier rather than red. This is important to note because if the reaction is not reflective of the depth of

the stone's color, this may also be indicative of a major, and potentially very costly, error in the identification of a stone. Let me share another experience with you.

The Case of the Colombian Emerald

A few years ago in Tucson, I was examining a large, beautiful, deep green Colombian emerald with a very high price tag. You can imagine my surprise when I looked at it through my Chelsea Filter and saw a pink reaction, rather than red; I knew something was very wrong. When I mentioned to the dealer, whom I knew and respected, that I had a serious reservation about his 'show-stopper emerald', he assured me it had been checked by his buyer and there was no doubt it was an emerald. He urged me to check it again and handed me his loupe and his portable refractometer. The refractometer gave the correct reading for an emerald and the inclusions immediately visible near the table indicated Colombian but when I focused deeper into the stone, the loupe revealed bubbles in the girdle area. That immediately raised another major red flag. The next step was to immerse the stone (I had a beaker and methylene iodide with me) and this quickly revealed that this 'gem emerald' was a doublet made by using a very pale green Colombian emerald crown and pavilion, held together by a paper thin plane of deep green glue! This gave the impression that the color was consistent throughout the entire stone. The dealer was devastated, but thanked me for saving him from what could have been a devastating mistake. In this case, this doublet might have been mistaken for a genuine, exceptionally fine, Colombian emerald had it not been for its reaction to a simple, inexpensive Chelsea Filter, especially if it had been mounted by an unsuspecting buyer who was not gemologically savvy.

Rule #5: When looking at rubies and emeralds, there is such a thing as having a reddish reaction that is 'too red'... beware of synthetic rubies and emeralds!



Synthetic Ruby

(Credits: Michiko Huynh, Alexandre Wolkonsky
& Jeffrey Hunt)

While synthetic rubies and synthetic emeralds are made using essentially the same recipe as Mother Nature, it is not exactly the same; humans use more chromium than Mother Nature. As a result, the reaction of these synthetics when viewed through the Chelsea Filter is even more intense than what we find in their natural counterparts. Thus, when you see a reaction that seems 'off the chart' you may very well be looking at a synthetic!

If you use a Chelsea Filter regularly, especially at major gem shows where you can spend a day viewing natural rubies and emeralds as well as synthetic rubies and emeralds, paying special attention to the intensity of their red reaction, it won't take long before you begin to recognize when the reaction is too strong.

This is actually the principle on which the Hanneman-Hodgkinson Synthetic Emerald Filter is based (which is used in conjunction with the Chelsea Filter). It is a filter that indicates the presence of too much chromium, which is indicative of synthetic material. Unfortunately there is no such filter (yet) for rubies, but whenever I look at a ruby, I am highly suspicious if I see what looks like a reaction that is **TOO** red, based on my experience with both natural and synthetic rubies.

During another Tucson Gem Show, I went to the booth of a ruby dealer in one of the 'tents' along the interstate, a show that is often frequented by buyers looking for bargains. This dealer had mounds of ruby rough, so I pulled out my Chelsea Filter to look at the rubies he was selling. They were all more or less the 'same color' but a very large number went 'off the charts' with the filter, while the others showed the kind of 'slightly more intense red' that I expected. His reaction to me using the filter was something I'll never forget. He said, 'I often wonder why more ruby dealers don't use a Chelsea filter'!

I was perhaps more surprised by his comment than by the number of synthetic rubies he was misrepresenting as natural! If you're inexperienced it's a bit difficult at the start when looking at single stones without having extensive experience in terms of what a 'normal' reaction should be, but with practice you'll be able to recognize when the reaction is 'too' much.

Rule #6: In general, when looking at green or red stones, you hope you will see red through the Chelsea Filter; when looking at blue stones - with the notable exceptions of cobalt spinel and tanzanite - you hope you won't see a reddish reaction!

When it comes to green stones, some of the rarest and costliest will show a red reaction through the Chelsea Filter, including chrome tourmaline, and emeralds from many sources, including Colombia, which are chromium rich and

do not contain sufficient amounts of iron. Notably, there is another exception to the green rule: 'chrome' diopside. Despite its name, chrome diopside does not appear red through the Chelsea Filter as one would expect given its name. This is because of the presence of iron, which suppresses the reaction.

With red stones, once again some of the rarest and costliest, including ruby, red spinel, and red beryl, will show an even stronger red when viewed through the Chelsea Filter, while stones such as almandine garnet and rubellite tourmaline simply show a dark red, but lack the intense red 'pop' seen in spinel and ruby.

Where blue stones are concerned, most natural-color blue stones will **NOT** show a red reaction through the Chelsea Filter; these include blue sapphire, indicolite tourmaline, aquamarine, iolite, natural and most treated blue topaz and most blue spinel. So if buying any stone described as blue sapphire, or any of these other stones, and it appears red through the Chelsea Filter, you know definitively that it is **NOT** one of these stones.



Natural Cobalt Spinel
(Photo by Tino Hammid)

There are a couple of notable exceptions to this 'rule' however. The most important is the very rare and highly collectible 'cobalt spinel' (which shows an intense red through the Chelsea Filter, and if it doesn't, it is not a cobalt spinel). Most tanzanite also show a reddish reaction (the more violet the undertone, the more red the reaction) but there is also a significant quantity of tanzanite that does not show a reddish reaction when viewed with the filter. However, all of the tanzanite imitations can be quickly separated from tanzanite with a simple dichroscope...the next tool we will discuss in Gemmology Today...or with the UV lamp.

I hope you can now better appreciate the wealth of information a Chelsea Filter can provide. Just remember that a Chelsea Filter alone will never tell you what you have. It should be used as a first step when examining colored gemstones primarily because of its value in telling you what you do **NOT** have; it is highly reliable in the negative, and a real time saver! But at

the same time, when a stone does not show the reaction it should show, you know that something is wrong! That's also valuable.

But to have any value at all, you must know how to use it correctly, and my experience has shown over the years that most people do **NOT** know how to use it properly. So let's review the proper technique for using a Chelsea Filter:

1. View the stone(s) under strong incandescent (warm) light, against a neutral background - preferably matte white or light grey.
2. Do not hold the stone in your hand (believe it or not, the pink coloration in your skin can provide a false impression when examining pastel color stones).
3. The light should be coming from above the stone, with the stone held so that the light hitting the stone's surface is reflected back toward your eye (this is essential for cut/polished stones; illuminating it from the back may cause you to miss subtle reactions to the filter). Only when examining rough material can you illuminate it from the back, as well as through the sides, and from several different directions, using both transmitted light and also light being reflected from the top of the rough.
4. Hold the filter close to your eye (about ½ to 1 inch from the eye) and hold the light close to the stone. **NOW** note the color reaction of the stone when viewed through the filter.
5. When viewed through the Chelsea Filter, the stone being examined will show either a shade of green (such as bluish-green, greyish-green or yellowish-green) or a shade of red (such as orangey-red, purplish-red or brownish red). Very dark stones such as sapphire may look 'blackish' through the filter.
6. Once you've looked at the stone through the Chelsea Filter, note the color you saw and refer to the charts that tell you what color various gems are supposed to show when viewed through the filter. Note: when any chart to which you may be referring indicates a stone's reaction is 'inert', this means it does not show any reddish reaction. But in reality, **NO COLORED STONE IS INERT**. Even if they are not showing red, no two different gemstone varieties will show the same hue through the Chelsea Filter! (This is one of the most misunderstood points pertaining to available information circulating about what you see with a Chelsea Filter).

Now, go out into the world, have fun, but never leave home without your Chelsea filter!



Mallorca Teaching Centre

PROFESSIONAL TRAINING COURSES & PROGRAMS

We are thrilled to announce the opening of the Mallorca Teaching Centre (MTC) in April 2018 here in Palma, Mallorca, Spain. The facility will be used to not only offer the World Gem Foundation theory and practical courses but also practical classes on gem cutting, jewellery, inclusion and gemstone photography and jewellery appraising.

Gemmology

The centre will offer the complete 'Career Gemmology' program in both Spanish and English.

Theory

In addition to our online courses, the theoretical components of the 'Career Gemmology' program will be offered at our centre (two evenings a week for a total of five hours) in Spanish starting on April 10, 2018.

Practical

Five practical workshops are available at the centre in five or eight-day formats or as evening classes in ten and sixteen week modules (3 hours per week). These workshops are a compulsory requirement of the World Gem Foundation's 'Career Gemmology' program but can also be taken independently based on a students level of interest and expertise.

Gemstone Cutting

Starting in 2019, join internationally renowned coloured gemstone cutters in our intimate and personalized five-day gem cutting classes. From basic gem cutting to advanced gem cutting techniques, these workshops will give you the knowledge and confidence required to cut your own stones.

Photography

The centre will also offer three two-day workshops; jewellery photography, inclusion photography and gemstone photography. Learn about the seven essentials needed to take professional photographs: knowing your camera, understanding exposure, mastering lighting, exploring depth of field, understanding perspective, composition and post processing.

Jewellery Appraisals

Working in partnership with Estimorum Appraising, we are pleased to offer their program in two formats; online or at our centre. During the online course or our five-day workshop you will learn the fundamental principles of appraising, the markets, the value components, correction factors, calculation formulas (including second hand jewellery) and how to prepare a professional appraisal report. We will also discuss the importance of using universally accepted descriptive terminology and the legal and ethical responsibilities an appraiser has to his clients.

Interested in antique jewellery? Our two-day antique jewellery workshop focuses on five important periods; Georgian, Victorian, Art Nouveau, Edwardian and Art Deco, discussing composition, theme and content, how to read hallmarks and most importantly how to distinguish authentic pieces from modern day reproductions.

'Sometimes it's the journey that teaches you a lot about your destination'



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Adhere to a compulsory code of ethics.

Have attained government accredited Level 5 diploma in valuation.

Hold a recognised qualification in gemmology.

Hold a recognised qualification in diamond grading.

Have a minimum of five years experience before becoming a member.

www.ncjv.com.au

Studying Gemmology with the World Gem Foundation

There's an expression 'different strokes for different folks' and this is certainly true in the case of gemmology. We are fortunate to work in an extremely diverse industry; one that provides unlimited opportunities in a broad range of disciplines.

Some people want to become a professional gemmologist; to forge a career for themselves working with gemstones. At the World Gem Foundation, gemmology is not just a job, it's a profession. This is why we opted for the 'Career Gemmologist' designation. We not only want to raise the level of consciousness with consumers but also within our industry. An awareness that gemmology is a science that demands a high level of theoretical knowledge and practical experience.

At the same token, we also understand that not everyone wants to become a fully fledged gemmologist. Many choose to specialise in a particular area, such as diamonds or coloured gemstones. Others decide to work in more defined areas such as the pearl, opal or jade sectors.

But what about gemmologists who may have completed their studies five, ten, fifteen or twenty years ago? Since gemmology is constantly evolving, it is important to continually upgrade your knowledge. You simply cannot afford to become complacent. One minute you may be 'up to speed', the next completely 'out of sync'. Each year brings new treatments and enhancements, new lab-created gemstones and new techniques to identify them. It is not the certificate that hangs on your wall that defines who you are as a gemmologist but the knowledge you possess. Our courses can be taken collectively or independent of each other, allowing our students to customise their own personal development programs based on their own specific needs.

Finally, there are many people who share a passion for gemstones but don't necessarily want to enrol in a gemmological program, they simply want to augment their existing knowledge and upgrade their level of understanding.

Regardless of your motivation to expand your knowledge, the World Gem Foundation has a variety of courses and programs that can help you reach your goal.

Career Gemmologist Program

For students wishing to pursue a career in gemmology, our 'Career Gemmologist' program has been especially designed to give you the knowledge and experience required to work as a professional gemmologist. The World Gem Foundation and our affiliated gem academies offer you two options to earn your Career Gemmologist Diploma with our Gemmology Seven/ Eleven programs.

Gemmology Seven

This option allows you to complete the entire theoretical requirements by enrolling in our Career Gemmology course (78 lessons) and completing the five practical workshops (Gem Identification #1, Gem Identification #2, Diamond Grading and Lab-created Diamonds, Coloured Gemstone Grading #1 and Lab-created and Treated Gems) and our 100 hour online Coloured Gemstone Grading course.

The theoretical component covers the chemical nature of gemstones, their physical and optical properties, basic crystallography, the absorption of light, the spectroscope, refraction and reflection, the refractometer, optical character and sign, dispersion, reflectivity meters, polarized light, the polariscope, pleochroism, the dichroscope, colour filters, specific gravity, luminescence, magnification and thermal conductivity.

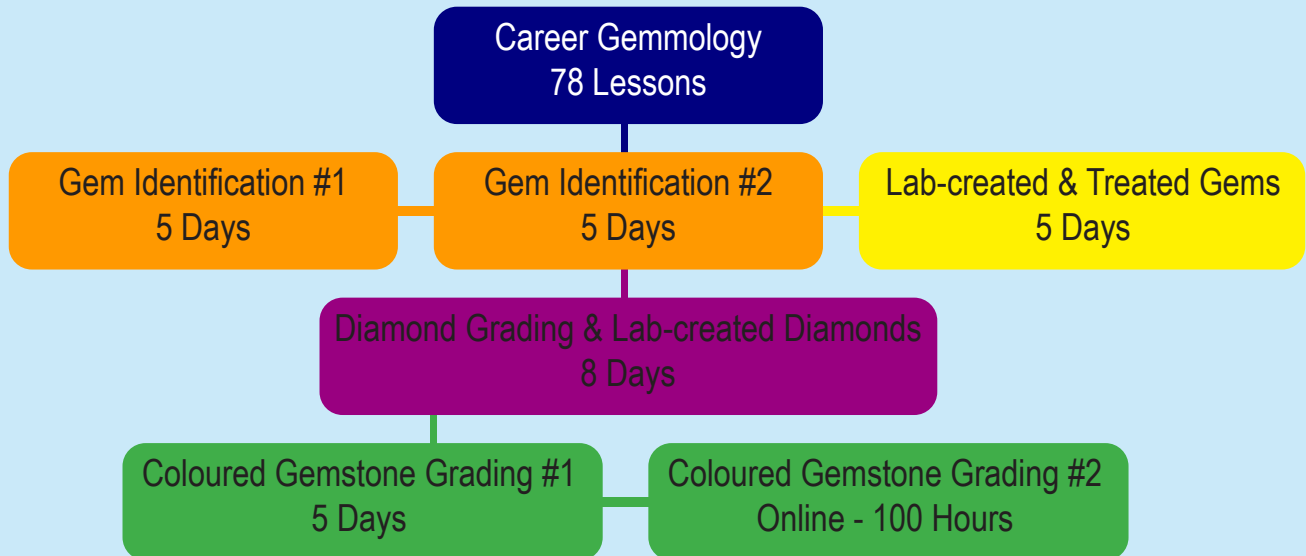
From there we move into the most challenging and fluid areas of gemmology; imitation and composite gemstones, lab-created gemstones and the treatment and enhancement of gems.

In the lessons pertaining to lab-created gemstones you will not only learn about the various methods used to manufacture lab-created gemstones (including Verneuil Flame-Fusion, Czochralski Pulling Method, Flux Melt Method, the Hydrothermal Method, Skull Crucible, Zone Melt, Horizontally Oriented Crystallization, the Sublimation Method, and the Modified Stober Method) but also the unique identifying features that allow us to separate them from their natural counterparts.

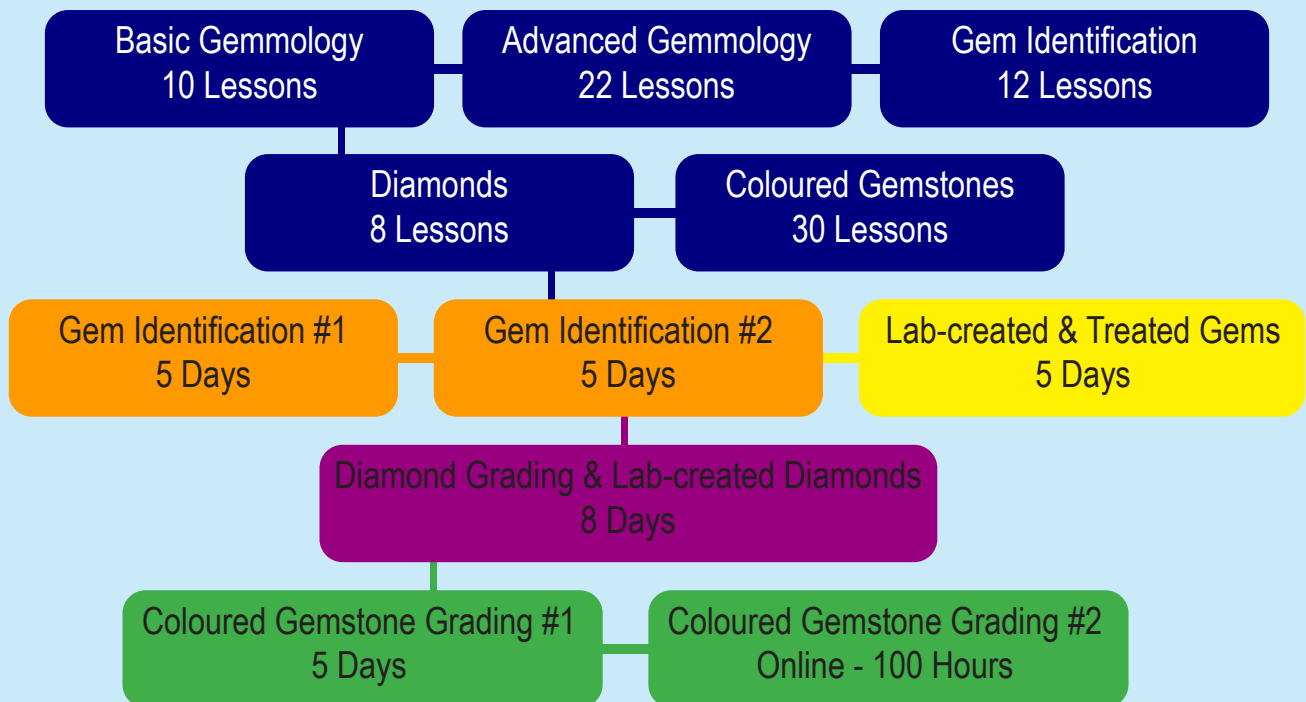
The use of treatments and enhancements is both demanding and depending on who you talk to, highly controversial. Here we look at not only the techniques used to treat and enhance gemstones (heat treatment, surface and sub-surface diffusion, lead glass fracture filling, flux assisted partial fissure healing, glass fracture filling, cobalt doped glass filled sapphires, clarity enhanced diamonds, HPHT, quench-crackling, surface modifications, coatings and foil backs, laser drilling and irradiation) but also how they can be detected. We also look at the advanced gem testing techniques that are often needed to identify many of these treatments.

The course then takes a slightly different direction, focusing on the identification of gemstones including the tests that are commonly used to identify them and an in-depth look at each of the ten gemstone groupings based on colour and transparency (colourless or white, red, pink, orange,

GEMMOLOGY SEVEN PROGRAM



GEMMOLOGY ELEVEN PROGRAM



yellow, blue, green, violet or purple, brown, black or grey). These lessons include the important varieties and species of gemstones that commonly occur within each colour grouping, how to distinguish gemstones that are commonly confused with each other (i.e. aquamarine and blue topaz, emerald and chrome green tourmaline, diamond and lab-created moissanite) or gemstones that have physical and optical properties that are similar (i.e. amethyst quartz and purple scapolite) to each other. This section also includes gemstones that either exhibit optical phenomena (i.e. asterism or chatoyancy) or are unusual by nature.

The next section looks specifically at diamonds, their physical properties, geology, localities, principle mines, crystal system, chemical composition and classification. You will also find lessons dedicated to fancy coloured diamonds, the causes of colour, absorption spectra, inclusions, fluorescence, mining, gem identification, methods of synthesis (including HPHT, CVD, Detonation and Ultrasonic Cavitation), common treatments and enhancements and a comprehensive examination of the 4 C's (colour, clarity, cut and carat weight) and how they are measured and assessed. The lesson on 'Cut' compares some of the most important and recognized 'Cut' grading systems used today including those pioneered by the Gemological Institute of America (GIA), the American Gem Society (AGS), Hoge Raad voor Diamant (HRD), the International Gemological Institute (IGI), the European Gemological Laboratory (EGL) and the Accredited Gem Appraisers (AGA).

The final twenty-nine lessons (29) are devoted to coloured gemstones and covers their physical properties, geology, localities, crystal system, chemical composition and causes of colour, varieties, absorption spectra, pleochroism, inclusions, fluorescence, gem identification, synthesis, common treatments and enhancements, and care guidelines. Gemstones covered include corundum, beryl, chrysoberyl, spinel, zircon, topaz, tourmaline, peridot, quartz, garnet, tanzanite, lapis lazuli, turquoise, spodumene, feldspars, iolite, andalusite, diopside, apatite, and organic gems (pearls, coral, jet, ivory, and amber). You will also learn about the various colour grading systems currently used (GIA, Gemewizard, GemDialogue and the World of Color) including how to accurately describe colour based on hue, tone and saturation, the clarity classification of gemstones, how cut is assessed, opal, jadeite and pearl grading, and how weight is assessed in a 'mounted' stones.

The study of gemmology simply would not be complete without a comprehensive program of practical instruction. This involves five practical workshops (Gem Identification #1 & #2, Diamond Grading and Lab-created Diamonds, Lab-created and Treated Gems and Coloured Gemstone Grading #1) totalling twenty-eight days of in-class instruction and a 100 hour online Coloured Gemstone Grading course where you will work with the Gemewizard Colour Grading system.

Gemmology Eleven

While the information is the same, the theoretical portion of this program is divided into five free-standing courses (Basic Gemmology, Advanced Gemmology, Gem Identification, Diamonds and Coloured Gemstones). This option allows you to take each course separately giving you greater flexibility in terms of time and how you can pay for the courses.

Like the 'Gemmology Seven' program, there are five practical workshops and one 100 hour online course.

General Interest

For those interested in gemstones but not wishing to take either the Gemmology Seven or Eleven programs, all of our theory courses can be taken independently without prerequisites. In addition to the six courses (Career Gemmology, Basic Gemmology, Advanced Gemmology, Gem Identification, Diamonds and Coloured Gemstones), we also offer two other 'General Interest' courses (Opals and Jade and Organic Gems).

Opals and Jade

This course looks at two of the most fascinating and complex gemstones in the science of gemmology. The lessons on opal cover their physical and optical properties, their geology, localities, crystal system, chemical composition and classification, varieties, cause of colour, absorption spectra and pleochroism, inclusions, fluorescence, principal mines, opal mining in Australia, opal grading, synthesis of opal, gem identification, common treatments and enhancements, opal doublets and triplets, cleaning and care and pricing.

The section on jade follows a similar format with lessons covering their physical and optical properties, their geology, localities, crystal system, chemical composition, absorption spectra and pleochroism, inclusions, fluorescence, mining, principal mines, evaluating the rough, jadeite cutting, jadeite nomenclature, grading jadeite, synthesis of jadeite, gem identification, common treatments and enhancements, cleaning and care and pricing.

Organic Gems

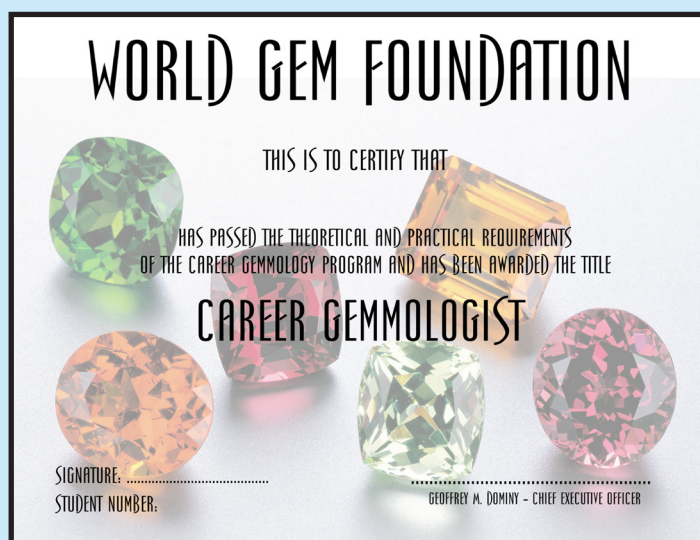
This course explores a very select group of gemstones (coral, jet, amber, ivory and pearls), formed through organic processes rather than through geological forces deep within the earth's surface. Lessons cover their physical and optical properties, geological formation, crystal systems, chemical composition, varieties and classification, causes of colour, common inclusions and internal characteristics, fluorescence, pearl grading criteria, methods of synthesis, gem identification, common treatments and enhancements, and cleaning and care instructions.

Individual Course Pricelist 2017

Course Name	Digital Option			Print Option		
	Euros	Pounds Sterling	USD	Euros	Pounds Sterling	USD
Basic Gemmology	200	150	225	235	180	265
Advanced Gemmology	400	300	450	430	325	485
Gem Identification	225	175	250	255	200	285
Diamonds	225	175	250	255	200	285
Coloured Gemstones	500	400	550	565	450	625
Career Gemmology	1400	1100	1600	1570	1235	1795
Opals and Jade	75	60	85	95	75	110
Organic Gems	50	40	55	65	50	75

Practical Workshops & Examination Fees

Course Name	Euros	Pounds Sterling	USD
Gem Identification #1 - Practical	500	400	550
Gem Identification #2 - Practical	500	400	550
Coloured Gemstone Grading #1 - Practical	500	400	550
Coloured Gemstone Grading #2 (Online)	1000	800	1150
Diamond Grading/Lab-created Diamonds - Practical	1750	1400	2000
Lab-created & Treated Gems - Practical	500	400	550
Examinations Fees (Gem Identification & Final Exam)	350	275	395



Fees charged by the individual gem academies are charged in the prevailing currency for that particular area (i.e. Euros in Europe, Pounds Sterling in Britain). Please note that shipping charges apply to any courses provided in print.

For more information please visit our website at www.worldgemfoundation.com

Practical Workshops

Gem Identification #1



Dates: May 7 - 11, 2018

Venue: Mallorca Teaching Centre

Course Cost € 500

[Reserve Your Place Now](#)

This five day (30 hour) practical workshop focuses on the study and identification of six colour groupings (colourless/white, red, pink, orange, yellow and green) and basic crystallography. Gemstones covered in this workshop include:

Natural Diamond, Natural Ruby, Natural Sapphire, Emerald, Beryl, Garnets (Spessartite, Almandite Rhodolite, Pyrope, Colour Change, Hessonite, Demantoid, Tsavorite and Grossular), Spinel, Tourmaline, Topaz, Beryl, Quartz, Zircon, Alexandrite, Chrysoberyl, Apatite, Kunzite, Sunstone, Sphalerite, Sphene, Phenakite, Brazilianite, Scapolite, Hiddenite, Danburite, Benitoite, Diaspore, Epidote, Kyanite, Idocrase, Sinhalite, Diopside, Korerupine, Enstatite, Euclase, Andalusite, Ekanite, Idocrase, Moldavite, Obsidian, Chrome Chalcedony, Amazonite, Jadeite, Nephrite, Chalcedony, Dyed Jasper, Chrysoprase, Maw-Sit Sit, Rhodonite, Rhodochrosite, Amber, Coral, Fire Opal, Lab-created Moissanite, Cubic Zirconia, GGG, YAG, Lab-created Rutile, Strontium Titanate, Lithium Niobate, Lab-created Spinel, Glass, Lab-created Alexandrite, Garnet-topped Doublet, Spinel Triplet, Copal Resin, Bakelite and Imitation Coral.

Prerequisites: Basic Gemmology or Equivalent

Gem Identification #2



Dates: May 14 - 18, 2018

Venue: Mallorca Teaching Centre

Course Cost € 500

[Reserve Your Place Now](#)

This five day (30 hour) practical workshop focuses on the study and identification of four colour groupings (blue, violet/purple, brown and black) plus unusual and phenomenal gemstones. Gemstones covered in this workshop include:

Sapphire, Benitoite, Spinel, Tanzanite, Apatite, Tourmaline, Topaz, Aquamarine, Quartz, Iolite, Zircon, Scapolite, Garnet (Grape, Rhodolite and Hessonite), Chrysoberyl, Taaffeite, Idocrase, Ekanite, Sinhalite, Korerupine, Andalusite, Kyanite, Euclase, Smithsonite, Sugilite, Charoite, Lapis Lazuli, Sodalite, Turquoise, Odontolite, Serpentine, Chrysocolla, Petrified Wood, Hematite, Marcasite, Pyrite, Jadeite, Jet, Chalcedony, Jasper, Coral, Obsidian, Cubic Zirconia, Bakelite, Dyed Jasper, Lab-created Forsterite, Lab-created Spinel, Lab-created Quartz, Glass, Gilson Lapis Lazuli, Gilson Turquoise, Stained Howlite, Star Sapphire, Star Ruby, Star Almandite Garnet, Star Diopside, Cat's Eye Chrysoberyl, Cat's Eye Tourmaline, Cat's-Eye Quartz, Hawk's Eye Quartz, Tiger's-Eye Quartz, Bi-Colour Tanzanite, Bi-Colour Tourmaline, Ametrine Quartz, Watermelon Tourmaline, Usambara Tourmaline, Trapiche Emerald, Labradorite, Moonstone, Bloodstone, Tortoiseshell, Shell Cameo, Hardstone Cameo, Lava Cameo, Ammolite, Fire Agate, Black Opal, Crystal Opal, Semi-Crystal Opal, Larimar, Malachite, Lab-created Cat's Eye Chrysoberyl and Imitation Cameo.

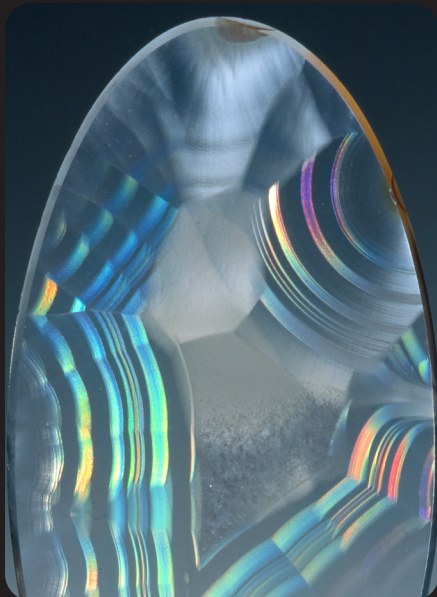
Prerequisites: Gem Identification #1 or Equivalent

Practical Workshops

Coloured Gemstone Grading #1

This five-day (30 hours) workshop includes practical instruction on how to access the hue, tone and saturation of coloured gemstones using three popular colour grading systems (Gemological Institute of America, GemDialogue and World of Color) and how to grade pearls, jadeite and opals.

Prerequisites: None

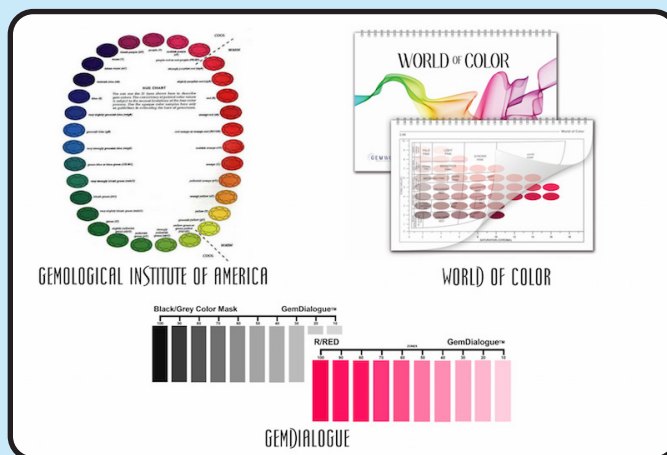


Dates: May 21 - 25, 2018

Venue: Mallorca Teaching Centre

Course Cost € 500

[Reserve Your Place Now](#)



Coloured Gemstone Grading #2

This 100 hour online course consists of a comprehensive overview of the GemWizard Colour Grading System including colour theory (hue, tone and saturation), how they impact on the value of gemstones, practical exercises that are completed online, and a six month subscription to the Gemewizard program.

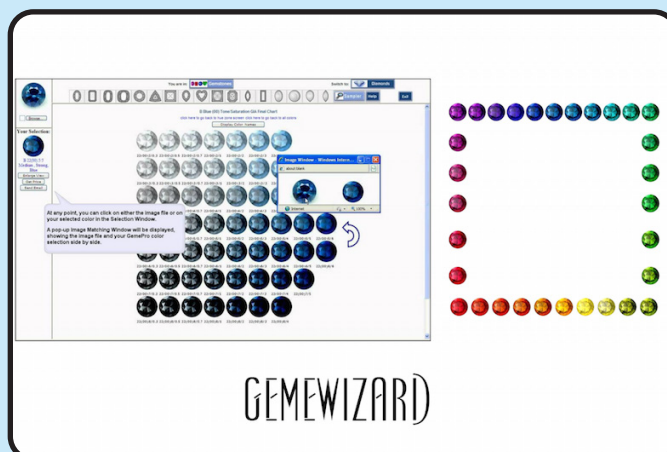
Prerequisites: None



Online Course

Course Cost € 1000

[Reserve Your Place Now](#)



Practical Workshops



Dates: May 28 - June 1, 2018

Venue: Mallorca Teaching Centre

Course Cost € 500

[Reserve Your Place Now](#)

Lab-created & Treated Gems

This five day (30 hour) practical workshop focuses on lab-created gemstones (specifically rubies, sapphires and emeralds) and the many treatments and enhancements that are used to improve the appearance and/or value of gemstones, including:

- Heat treatment
- Surface and Sub-surface Diffusion
- Irradiation
- Fracture Filling
- HPHT Treatment
- Oiling
- Waxes & Dyes
- Sugar/Acid & Smoke Inhalation
- Quench-crackling with Dyes
- Coating & Foil Backs
- Laser Drilling

Prerequisites: Advanced Gemmology or Equivalent



Dates: June 4 - 8 & 11 - 13, 2018

Venue: Mallorca Teaching Centre

Course Cost € 1750

[Reserve Your Place Now](#)

Diamond Grading & Lab-created Diamonds

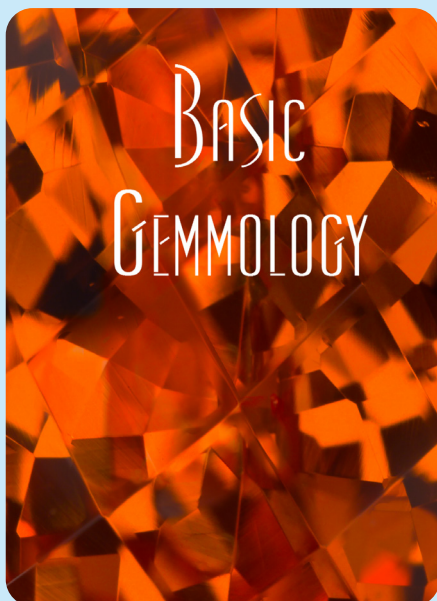
This eight day (48 hour) practical workshop focuses on the clarity and colour grading of diamonds, how to measure the proportions and how to distinguish natural from HPHT and CVD diamonds.

Topics covered include:

- Clarity Grading
- Colour Grading
- Calculating Table Percentage
- Calculating Crown Angle
- Calculating Pavilion Percentage
- Estimating Girdle Thickness
- Assessing Symmetry & Polish
- Lab-Created Diamonds
- Practical Review

Prerequisites: Diamonds or Equivalent

Theoretical Courses



Course Content

The chemical nature of gemstones, physical and optical properties, basic crystallography, the absorption of light, the spectroscope, refraction and reflection, the refractometer, optical character and sign, dispersion, reflectivity meters, polarized light, the polariscope, pleochroism, the dichroscope, colour filters, specific gravity, luminescence, magnification and thermal conductivity.

Course Cost: € 200

Prerequisites: None

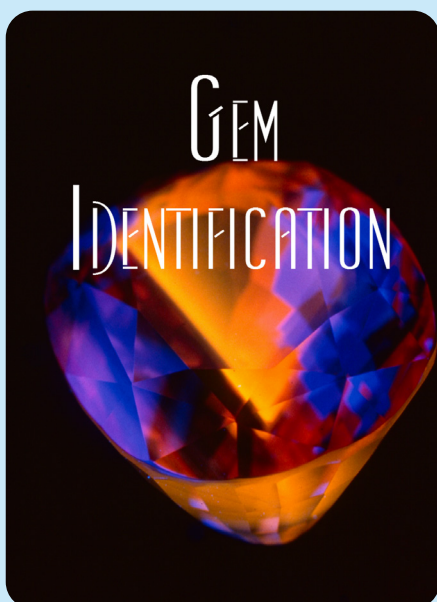


Course Content

Imitation and composite gemstones, methods used to manufacture lab-created gemstones including Verneuil, Czochralski, Flux Melt, Hydrothermal, Skull Crucible, Zone Melt, Horizontally Oriented Crystallization, HPHT, CVD, Detonation, Ultrasonic Cavitation, Sublimation Method, and Modified Stober Method, their unique identifying features, treatments and enhancements including heat treatment, surface and sub-surface diffusion, lead glass fracture filling, flux assisted partial fissure healing, glass fracture filling, cobalt doped glass filled sapphires, clarity enhanced diamonds, HPHT, quench-crackling, surface modifications, coatings and foil backs, laser drilling, irradiation, and advanced gem testing techniques.

Course Cost: € 400

Prerequisites: Basic Gemmology or Equivalent

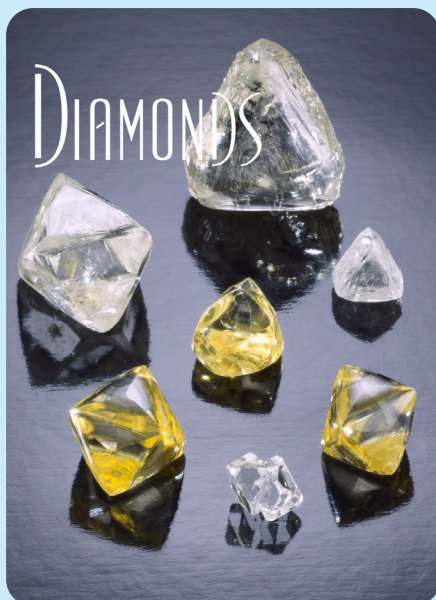


Course Content

Introduction to gem identification and the tests that are commonly used to identify gemstones. An in-depth look at each of the ten colour groupings (colourless or white, red, pink, orange, yellow, blue, green, violet or purple, brown, black or grey) plus phenomenal or unusual gemstones. Important varieties and species of gemstones that commonly occur within each colour grouping. How to distinguish gemstones that are commonly confused with each other (i.e. aquamarine and blue topaz, emerald and chrome tourmaline, diamond and lab-created moissanite) or have physical and optical properties that are similar (i.e. amethyst quartz and purple scapolite). All lab-created, imitation, treated and enhanced gemstones that are found in each colour grouping.

Course Cost: € 225

Prerequisites: Basic & Advanced Gemmology or Equivalent

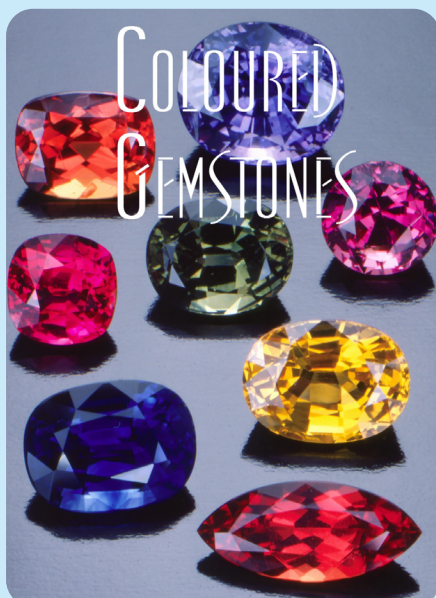


Course Content

Physical properties, geology, localities, principle mines, crystal system, chemical composition and classification, fancy colours, causes of colour, absorption spectra, pleochroism, inclusions, fluorescence, mining, gem identification, methods of synthesis, common treatments and enhancements. You will learn all about the 4 C's (colour, clarity, cut and carat weight) and how they are measured and assessed. We will also compare the various 'Cut' criteria for the Gemological Institute of America (GIA), the American Gem Society (AGS), Hoge Raad Diamant (HRD), International Gemological Institute (IGI), the European Gemological Laboratory (EGL), and Accredited Gem Appraisers (AGA) and explain how the estimated weight of a 'mounted' gemstone is calculated.

Course Cost: € 225

Prerequisites: None



Course Content

Physical properties, geology, localities, crystal system, chemical composition and causes of colour, varieties, absorption spectra, pleochroism, inclusions, fluorescence, gem identification, synthesis, treatments and enhancements, and care guidelines. Gemstones covered in this course include rubies and sapphires, emeralds, aquamarines and other precious beryls, alexandrite and other chrysoberyls, spinel, zircon, topaz, tourmaline, peridot, quartz, garnet, tanzanite, lapis lazuli, turquoise, kunzite, hiddenite, feldspars, iolite, andalusite, diopside, apatite, pearls, coral, jet, ivory, and amber. You will learn how to accurately describe colour, the various colour grading systems currently used by professionals, the clarity classification of gemstones based on their geological environments, how cut is assessed, and how to grade opals, jadeite and pearls.

Course Cost: € 500

Prerequisites: None



Course Content

Topics covered in the course include their physical and optical properties, geological formation, crystal systems, chemical composition, varieties and classification, cause of colour, absorption spectra, common inclusions, fluorescence, mining, grading criteria, methods of synthesis, gem identification, common treatments and enhancements, cleaning and care instructions, and pricing.

Course Cost: € 75

Prerequisites: None

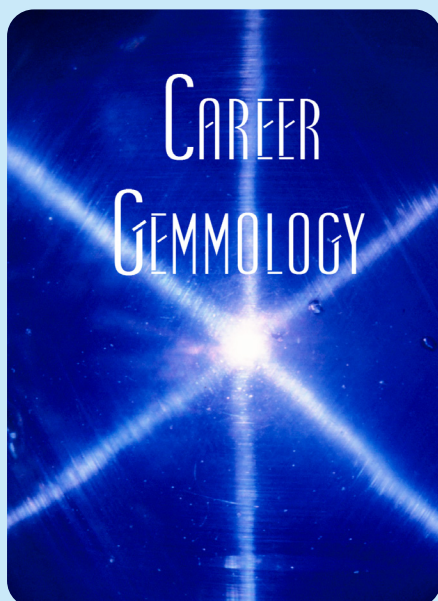


Course Content

Topics covered include their physical and optical properties, geological formation, crystal systems, chemical composition, varieties and classification, cause of colour, common inclusions and internal characteristics, fluorescence, pearl grading criteria, methods of synthesis, gem identification, common treatments and enhancements, and cleaning and care instructions.

Course Cost: € 50

Prerequisites: None



Course Content

The chemical nature of gemstones, their physical and optical properties, basic crystallography, the absorption of light, the spectroscope, refraction, reflection and the refractometer, polarized light, the polariscope, pleochroism, the dichroscope, colour filters, specific gravity, luminescence, magnification, thermal conductivity, imitation, assembled and lab-created gemstones, the methods used to manufacture lab-created gemstones including Verneuil, Czochralski, flux melt, hydrothermal, skull crucible, zone melt, horizontally oriented crystallization, high pressure, high temperature (HPHT), chemical vapour deposition (CVD), detonation, ultrasonic cavitation, sublimation method, and modified Stober method, their unique identifying features, treatments and enhancements including heat treatment, surface and sub-surface diffusion, lead glass fracture filling, flux assisted partial fissure healing, glass fracture filling, cobalt doped glass filled sapphires, clarity enhanced diamonds, high pressure, high temperature (HPHT), quench-crackling, surface modifications, coatings and foil backs, laser drilling, and irradiation, gem mining and cutting, diamond and coloured gemstone grading, gem identification by colour and transparency, advanced gem testing techniques and a comprehensive overview of the twenty-seven most common groups, species and varieties including diamonds, corundum (rubies and sapphires), beryl (emeralds, aquamarines and other precious beryls), chrysoberyl (alexandrite and other chrysoberyl), spinel, zircon, topaz, tourmaline, peridot, quartz, garnet, tanzanite, lapis lazuli, turquoise, opal, jadeite, kunzite and hiddenite, feldspars, iolite, andalusite, diopside, apatite, pearls, coral, jet, ivory and amber.

Course Cost: € 1400

Prerequisites: None

Please Note: To complete the 'Career Gemmology' program and receive the diploma, students must complete the 'Career Gemmology' theory course or the five component theory courses (Basic Gemmology, Advanced Gemmology, Gem Identification, Diamonds and Coloured Gemstones) plus the five practical workshops, the online Coloured Gemstone Grading #2 course and the applicable examinations.



MALLORCA GEMQUEST GEMMOLOGICAL CONFERENCE SEPTEMBER 22 - 23, 2018

We are delighted to announce that the 2nd Mallorca GemQuest Gemmological Conference will be held in the beautiful town of Sóller, located in the Unesco World Heritage Serra de Tramuntana on September 22nd and 23rd, 2018 at the Gran Sóller Hotel.

Speakers include:

Dr. Katrien de Corte - Chief Education Officer - HRD Antwerp

Alan Hodgkinson - Gemmologist and Author - Scottish Gemmological Association

Dr. Laurent Massi - Gemmologist & Educator, CEO of Laurent Massi Gem Training & Development

Antoinette Matlins - Gemologist & Author

Menahem Sevdemish & Guy Borenstein - GemeWizard

Geoff Dominy - Founder of the World Gem Foundation & Author

Schedule:

The conference will include six lectures on Saturday, September 22nd and two lectures and two workshops on Sunday, September 23rd, 2018.

Delegates can select three conference packages: Full Conference Package (September 22nd & 23rd all inclusive), Conference Package A (September 22nd - Lectures & Lunch) or Conference Package B (September 22nd - Lectures, Lunch & Conference Dinner).

Conference Schedule

September 22nd, 2018

Lectures

Time	Event
9.00 - 9.15	Welcome & Introduction
9.15 - 10.15	Synthetic Diamonds - Better, Cheaper and More with Dr. Katrien de Corte
10.15 - 11.15	Spinel - Stepping out of the Shadows with Dr. Laurent Massi
11.15 - 11.45	Refreshments
11.45 - 12.45	Pushing the Polariscope with Alan Hodgkinson
12.45 - 13.45	Tanzanite - Gemstone of a Generation with Menahem Sevdermish
13.45 - 15.15	Lunch
15.15 - 16.15	Testing Times with Antoinette Matlins
16.15 - 17.15	Objective Diamond Clarity Grading with Geoff Dominy
19.30 - 21.30	Conference Dinner

September 23rd, 2018

Lectures & Workshops

Time	Event
9.30 - 10.30	Rags to Riches - the Genesis of a Gemstone with Dr. Laurent Massi
10.30 - 12.00	Workshop - GemeWizard: Putting the 'U' back into Color with Menahem Sevdermish and Guy Borenstein
12.00 - 13.00	Lunch
13.00 - 14.00	Pearls of Wisdom - Making the Grade with Antoinette Matlins
14.00 - 15.30	Workshop - The Hodgkinson Blues with Alan Hodgkinson

Please check our Mallorca GemQuest Conference website for more information at:

www.mallorcagemquest.com

Sóller, Mallorca

The authentic town of Sóller sits in the heart of the 'Valley of Oranges' or 'Valley of Gold' as it is sometimes known, and offers much to visitors and residents.

Located in the northwest of Mallorca, Sóller became wealthy due to the valley's abundant citrus groves. In the 19th century, when the area was isolated from the rest of Mallorca by mountains, the oranges were shipped to France from the nearby Puerto de Sóller. Many locals went to work in France and returned – their fortunes duly made – to build some of the many handsome Modernista properties that grace Sóller today.

Gran Sóller Hotel

The Gran Sóller Hotel is located in one of the most characteristic buildings in Sóller, a depiction of the architecture of the town in the XIX Century. Built by the architect Joaquín Pavía Birmingham, creator of the Diputación de Mallorca (headquarters of the Council of Majorca) and the extension works of the Cathedral of Palma de Majorca, this 5 star hotel provides an oasis of culture and relaxation; classic luxury with a hint of glamour with modern services for the comfort and enjoyment of its guests.





Conference Packages

We are delighted to offer you three conference options:

Full Conference Package

This conference package includes:

September 22nd, 2018

- Six Lectures
- Coffee/Tea & Snacks
- Three Course Lunch
- Four Course Conference Dinner

September 23rd, 2018

- Two Lectures & Two Workshops
- Three Course Lunch

Price: € 359 (After March 31st, 2018: € 399)

Conference A Package

This conference package includes:

September 22nd, 2018

- Six Lectures
- Coffee/Tea & Snacks
- Three Course Lunch

Price: € 199 (After March 31st, 2018: € 219)

Conference B Package

This conference package includes:

September 22nd, 2018

- Six Lectures
- Coffee/Tea & Snacks
- Three Course Lunch
- Four Course Conference Dinner

Price: € 249 (After March 31st, 2018: € 269)

Please Note:

Due to the venue, space is limited to 75 Delegates

Presentations

Synthetic Diamonds - Better, Cheaper and More with Dr. Katrien de Corte

Synthetic diamonds of top quality (D colour, loupe clean) are on the market and vary in size from 0.005ct to 3.00ct and even larger. The identification of these stones in a laboratory is based mainly on optical defects visible in photoluminescence spectroscopy and on the analyses of growth patterns. This lecture provides an overview of the growth methods, characteristics of synthetic diamonds and the screening instruments used to detect them.

Spinel - Stepping out of the Shadows with Dr. Laurent Massi

For centuries, spinel has lived in the shadows of the nobler ruby and blue sapphire, often misunderstood, certainly undervalued and most definitely under appreciated. Finally, spinel is getting noticed, not only by gem collectors and connoisseurs but by jewellers who are struggling to find alternatives to fine quality rubies and blue sapphires and the stratospheric prices they are commanding. If life is all about timing, there has never been a better time for spinel to shine. Dr. Laurent Massi is passionate about spinel and he hopes by the end of his talk, you will be too!

Pushing the Polariscope with Alan Hodgkinson

In an age of modern technology, renowned gemmologist Alan Hodgkinson brings us back to earth, looking at an instrument that will not only tell us if a gemstone is singly or doubly refractive but so much more! From faceted gemstones to rough, there is more to the polariscope than meets the eye.

Tanzanite - Gemstone of a Generation with Menahem Sevdermish

Discovered in the 1960s and named after Tanzania by Tiffany & Co. the famous jewellery firm declared it to be the most beautiful stone discovered in the last 2,000 years. However with a very limited supply it is entirely likely that this generation will be the last one able to buy stones from the primary market before the supply is exhausted. What does the future hold for this rare and beautiful gemstone?

Testing Times with Antoinette Matlins

When it comes to gem identification it's not who you know but what you know and Antoinette knows an awful lot. In 'Testing Times', Antoinette breathes new life into basic gem instruments and shows you how to get maximum mileage out of them without breaking the bank!

Objective Diamond Clarity Grading with Geoff Dominy

Two of the cornerstones of diamond grading are accuracy and consistency. Pioneered by Michael D. Cowing, 'Objective Diamond Clarity Grading' alters the 'playing field' considerably by introducing a system that removes the subjectivity of diamond clarity grading. Now it is even possible for 'novice' diamond clarity graders to reach a level of consistency that up until now has only been possible after years of experience and the examination of thousands and thousands of diamonds.

Rags to Riches - The Genesis of a Gemstone with Dr. Laurent Massi

Forged through heat and pressure, adorned, revered and treasured by Man, gemstones have held an esteemed position since the beginning of time. In Rags to Riches – The Genesis of a Gemstone, Dr. Laurent Massi looks at the metamorphosis of a gemstone from rough mineral to dazzling rock.

Workshop - GemeWizard: Putting the 'U' back into Color with Menahem Sevdermish & Guy Borenstein

One of the challenges facing our industry is the effective communication of colour and how we assess the quality and value of coloured gemstones and fancy coloured diamonds. Test drive GemeWizard, find out how it works, why it works and why you should not leave home without it. Please Note: Participants must have a laptop or iPad to access the digital aspects of this presentation.

Pearls of Wisdom - Making the Grade with Antoinette Matlins

Known as the 'Queen of Gems', pearls have aroused passion, desire and fascination since before recorded history. Symbolizing perfection, modesty and purity, their unparalleled beauty is one of nature's great treasures. In 'Pearls of Wisdom – Making the Grade', Antoinette discusses their origin and the seven factors that determine their value.

Workshop - The Hodgkinson Blues with Alan Hodgkinson

Always passionate, always engaging and always full of enthusiasm, join Alan as he explores all things blue and beautiful. This workshop covers the A to Z of blue gemstones with a few surprises along the way.

**With over 250 images, Objective Diamond Clarity Grading
is a complete A to Z on how to clarity grade diamonds with
confidence and consistency**



Objective Diamond Clarity Grading

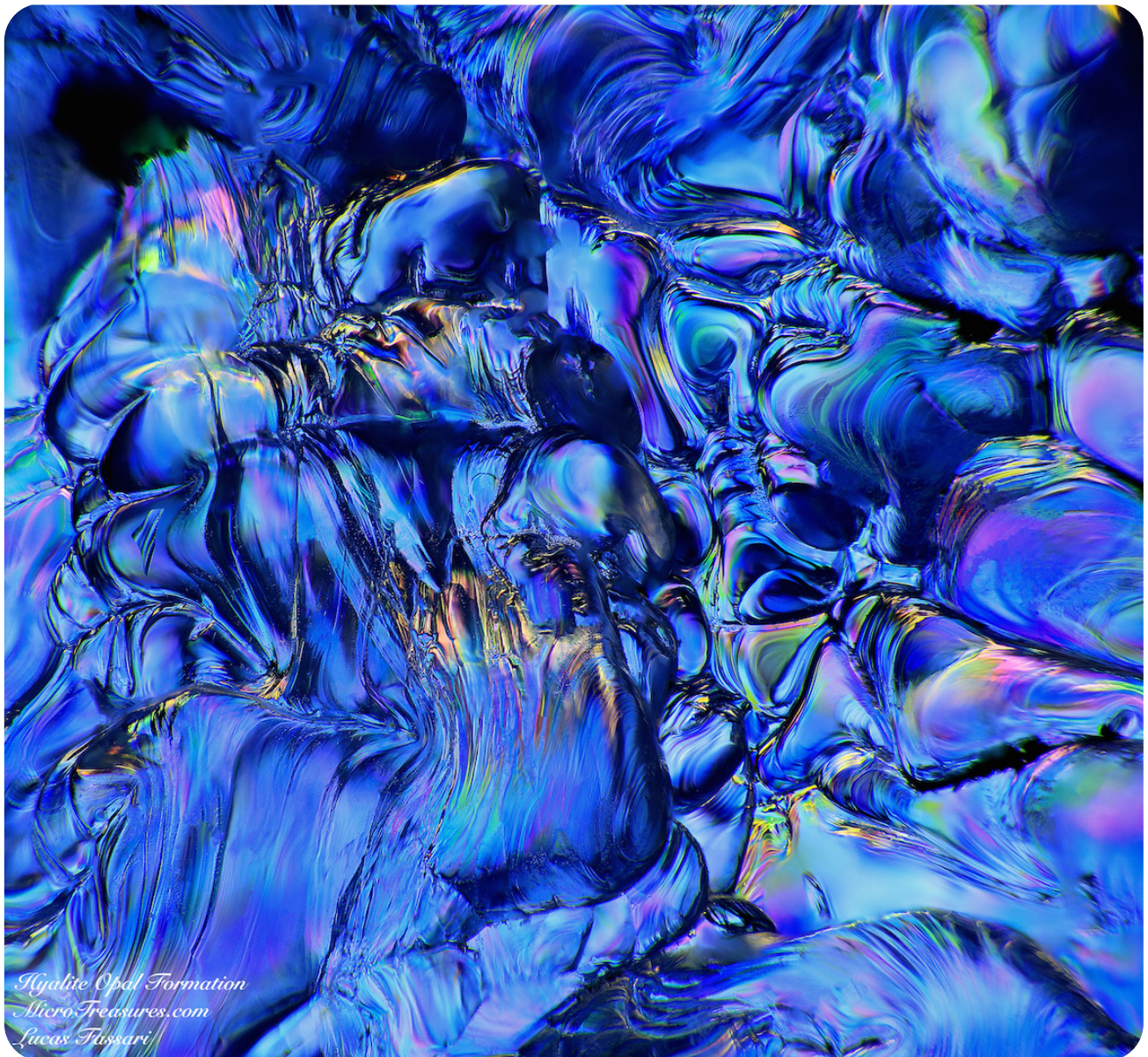
Michael D. Cowing

Edited by Geoffrey M. Dominy
Author of The Handbook of Gemmology

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Hyalite Opal Formation Artwork
by Lucas Fassari available at microtreasures.com



If you are interested in offering World Gem Foundation courses through an existing school, college, university or gemmological organization or you would like to establish your own gem academy please contact us at:

information@worldgemfoundation.com

Smart Thinking

Smart
is good.

Kirk Feral is a man who is passionate about gemmology. He particularly likes to make it more accessible by getting back to basics. In a world of high-tech instrumentation, Captain Kirk brings us down to earth.

A Propensity for Density - Specific Gravity Made Simple

What is Specific Gravity?

Specific gravity is an awkward scientific term that simply refers to density. In gemology, the specific gravity of a gem is the density of a gem relative to the density of water. For example, corundum gems have a specific gravity value of 4.0, which means sapphires and rubies are 4 times denser than water.



Lab-created Ruby

All gems are denser than water and sink when immersed, but they actually weigh less in water than in air. Gems have slight buoyancy in water because the pressure of water around a gem exerts an upward thrust, causing a loss in gem weight. This upward thrust or buoyancy force is equal to the weight of the volume of water being displaced by the gem. The Greek mathematician Archimedes figured this out over 2,000 years ago.

Since no gem floats in pure water, we cannot see its buoyancy, but we can use a specific gravity tester to measure the loss in weight when a gem is placed in water. This is called the 'Hydrostatic Method of Specific Gravity', as opposed to the outdated heavy liquid method, which entailed floating gems in toxic solutions of varying densities.

The hydrostatic method for measuring specific gravity was greatly simplified with the advent of the digital weight scale, which eliminated the time-consuming manipulation of weight required with vintage mechanical pan balances such as the diamond balance.

We calculate specific gravity simply by subtracting the weight of the gem in water from the weight of the gem in air, and then dividing that number into the weight of the gem in air:

$$\frac{\text{Weight in Air}}{\text{Weight in Air} - \text{Weight in Water}}$$

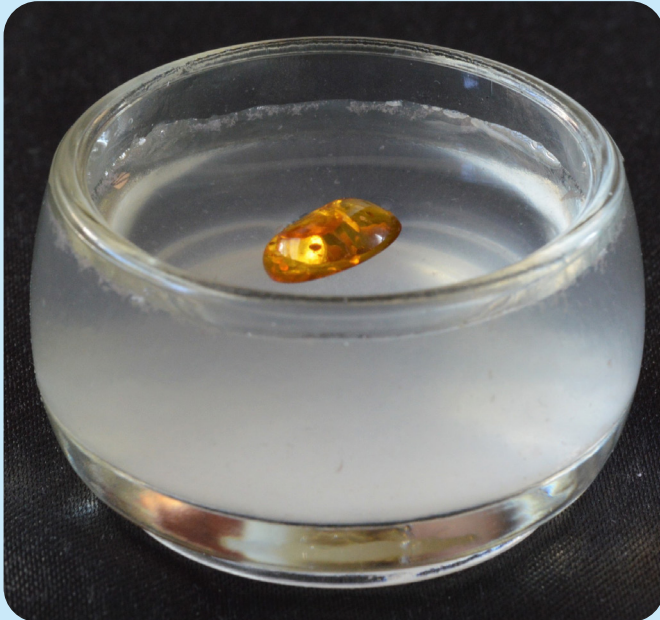
Gem Weight and Gem Size

We've heard that 'the bigger they come, the harder they fall', but the saying isn't always true. It largely depends on the specific gravity of whatever is falling. A one inch ball of lead has greater mass and weight than a much larger six inch ball of cotton, and we are fairly sure the lead ball would fall harder on one's head. The gravitational pull force on any object is specific to the mass of the object. Hence, I suppose, the term specific gravity.

We can feel the heft or weight of a stone in the palm of our hand or fingers as a qualitative method for estimating the density of the stone, or how hard it might fall if it were above our head. Assessing the heft of a gemstone relative to its size directly corresponds to the quantitative measurement of specific gravity.

Gems with a high specific gravity will feel heavier in the hand than gems with low specific gravity (S.G.). However, it is difficult to sense differences in heft when gems are small. Amber has the lowest S.G. of any gemstone and is only slightly heavier than water. Amber feels very light in the hand, and a cabochon of amber appears nearly 4 times the size of a sapphire cabochon of the same weight.

Amber will actually float in water if we increase the density of the water by saturating it with salt. The S.G. of an amber gem is then less than the S.G. of salt water, and the gem's buoyancy becomes visually apparent.



Amber floating in Saturated Salt Solution

Opal is another gemstone with low specific gravity and light heft. Any opal gem will appear nearly twice the size of any sapphire or ruby gem of equal weight.



Opal & Blue Sapphire

Gems with high specific gravity appear smaller than gems of the same weight that are less dense. For example, zircon is one of the heaviest transparent gemstones of natural origin, with S.G. values reaching 4.7. This means that a 6 carat quartz gem would appear the same size as a 10 carat zircon that has a similar shape or cut. The characteristically high S.G. of most zircons makes heft and specific gravity excellent tests for identifying zircon.

Factors that Affect Specific Gravity

The density of any gem is determined by its molecular structure and chemical composition. In gemstones colored primarily by dispersed metal ions such as iron or chromium, increasing concentrations of these metal ions causes an increase in the density of the gems.

The densities of the metallic coloring agents are always higher than the densities of the non-metal components of the gems they color. The refractive index values (R.I.) and magnetic susceptibility index values (S.I.) for these gems also increase as the specific gravity values (S.G.) and concentration of metals increase.

Among natural transparent gemstones, particularly allochromatic gems colored by metallic impurities, variations in density (S.G.) are usually small, staying within a very limited range. Variations are generally more pronounced among idiochromatic gems such as garnets.

For example, within the almandine species of garnet, as the concentration of iron increases, the density of almandine increases. The actual range of S.G. that we have found after testing numerous almandine gems from different parts of the world begins at S.G. 3.95 and rises to a high of S.G. 4.15. The refractive index also increases from R.I. 1.773 to R.I. 1.80, and magnetic susceptibility increases from S.I. 22 to S.I. 29.



Almandine Garnet

The Pros and Cons of Specific Gravity Testing

Cons

Specific gravity testing is frequently under-utilized as a gem identification method, likely because it is a 3-step process, coupled with the fact that gem identification can often be achieved without S.G. Also, obtaining readings that are

accurate can sometimes be problematic. The accuracy of hydrostatic readings varies with the size of the gem being tested.

The difference between a gem's weight in air and its weight in water decreases as the gem size becomes smaller. As a result, the margin of error for S.G. calculations can become significant for small gems. The accuracy of hydrostatic readings is generally not reliable for gems under 1 carat in weight. When we must test small stones, it's best to take 3 separate readings and then average them.

Another drawback to specific gravity testing is that only loose gems can be tested. When gems are set in jewelry, the density of the metal settings precludes any meaningful S.G. readings.

Pros

Despite these limitations, specific gravity testing remains one of the most useful methods we have for identifying gemstones. S.G. testing becomes critical when optical properties such as refractive index, birefringence, optic character and optic sign cannot be tested or accurately measured, as is the case with cabochons, tumbled stones and facet-grade rough.

S.G. measurements allow us to distinguish opaque nephrite cabs from jadeite cabs, and both can be distinguished from serpentine cabs. Translucent chalcedony cabs can look similar to prehnite cabs, but S.G. measurements separate them, and both can be separated from opal cabs. Opaque blue lapis lazuli cabs are definitively distinguished from blue sodalite cabs by differences in SG.



Chalcedony & Opal Cabs

We can also use S.G. readings to help us identify transparent gems of high brilliance whose refractive indices cannot be measured because their R.I.'s are above 1.81. Among such gems, S.G. helps us distinguish cubic zirconia from YAG, sphene from sphalerite, and cassiterite from cerussite.

As another example, a high measured S.G. value for a colorless zircon gem clearly tells us the gem cannot be a colorless diamond. Of course, the double refraction of zircon also eliminates diamond as a potential identity, and checking for double refraction is a simpler test.

Often during the gem identification process, specific gravity is useful as a confirmation test. For example, when a gem has a refractive index of 1.77, specific gravity helps to confirm the identity of corundum. Similarly, when the R.I. of a gem is 1.54, S.G. helps to confirm quartz. In both of these cases, a third test for birefringence, optic character or some other property may be necessary to reach a final identification.

Where Can I Get a Specific Gravity Tester?

You can purchase a specific gravity testing apparatus from online suppliers such as mineralab.com or kassoy.com, minus the digital gem scale component, for under \$100. The apparatus is basically a wire scaffold that rests on top of a digital scale. You'll need a reliable digital gem scale that is accurate to .005ct (.001 grams). These scales are available online for as little as \$20.

If you already have a gem scale, you can easily make your own S.G. tester from household items for under \$5.

The 4 components you'll need to make your specific gravity tester are:

- A digital gem scale accurate to .005ct (.001 grams).
- A base to support the scale
- A container for water that rests under the base
- A wire gallow and basket (all one piece) to suspend the stone in water

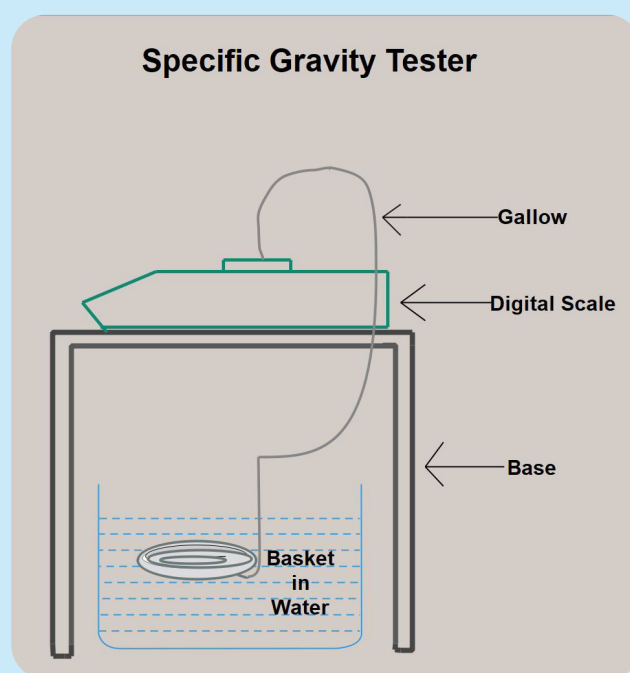


Diagram of S.G. Tester

Procedure

Step One

For the base, a wax-coated half-gallon milk or juice carton makes a light but sturdy base that will last for years (a base constructed of wood is not necessary, but equally functional).

Use a razor or 'x-acto' knife to cut off the top half of the milk/ juice carton so that you are left with a bottom portion that stands about 5.25" high. Then cut away one face of this bottom portion of the carton so that it is open on one side and open on the bottom. Use a can of spray paint to paint the base black or whatever color you like.



Milk Carton Cut-Out

Step Two

For the water container, use a 4" x 6" x 2.5" tall plastic storage container (24 ounce capacity) from the kitchen or the dollar store. You may need to trim off the top rim of the container with a razor to make the sides of the container flush so that they fit neatly into the opening of the base.

Step Three

To make the gallow and basket that is used to suspend the gem in water, start with a coil of 18 gauge aluminum wire purchased from the hardware store. Aluminum wire is pliable and won't rust. Cut a 2.5' length of wire, and begin tightly spiraling one end of the wire using needle nose pliers and your fingers.

Once your spiral is about 2" in diameter, push the center of the spiral down just a bit to give it the 3-dimensional effect of a basket. Then bend the wire at the head of the basket at a 90 degree angle so that the remaining segment of wire becomes perpendicular to the basket. This is your gallow.

Bend the gallow into the shape of a question mark so that when the tip of the gallow rests on the weighing pan of the digital scale, the spiral basket at the other end hangs under the scale level with the floor of the water container below. The basket should hang about 1" above the floor of the container without touching the sides.

Fast and Easy Testing

S.G. testing becomes a fast and convenient method of gem identification when you keep your specific gravity tester out and ready to go in your workspace. You'll be more likely to use this test when set-up is not required each time you begin the identification process.

Keep the water container full, and have your digital scale resting on top of the base. If possible, have a dedicated scale for this purpose. Using distilled water in your container is preferable to tap water, as tap water contains dissolved solids that slightly increase the density of the water. But if you find it more convenient to use tap water, then by all means use it.

To measure the specific gravity of a gem, place the tip of the gallow onto the weighing pan, and let the basket hang fully immersed in the water. Turn on the scale. Tare the weight of the gallow & basket (allowing the weight to revert to zero), and then place a gem on the weighing pan to measure the gem's weight in air.



Weighing the Gem in Air

Then without turning off the scale, remove the gem from the weighing pan and place it in the basket. The gem must be fully immersed in the water. Take a second reading on the scale, which is the weight of the gem in water. Finally, turn off the scale and remove the gem from the basket.

Now you can calculate the S.G. value for the gem. Subtract the weight in water from the weight in air and divide that number into the weight in air. That's all there is to it!

All photos and diagram by Kirk Feral



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Meet the Team



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Geoffrey M. Dominy
WGF Founder

Geoffrey Dominy is an author, independent gemmologist and former jewellery appraiser who appeared on the Canadian Antiques Roadshow for four seasons. He received his F.G.A through the Gemmological Association of Great Britain (Gem-A) in 1987 passing the diploma examinations with distinction.

Throughout the 1990's, Geoff developed and taught the 'Gemmology' program at Red River Community College and The University of Manitoba in Winnipeg, Canada, worked for the Canadian Institute of Gemmology, was President and Founder of the Jewellery Appraisers Association of Canada and was a contributing author for the 5th & 6th Editions of Robert Webster's 'Gems' which even today is considered one of the most authoritative textbooks in Gemmology.

In 2013, he released the first digital gemmological textbook entitled 'The Handbook of Gemmology' in collaboration with world famous gem photographer Tino Hammid. Now in its third edition, the handbook has been sold or downloaded in forty-seven countries, is used by fourteen schools, colleges, universities and gemmological organizations as their recommended textbook and now features photographic contributions by another award winning photographer Jeff Scovil.

Geoff currently lives in Palma, Mallorca, Spain and in addition to lecturing and promoting his book, is the founder of the World Gem Foundation and Mi Isla También.



Leone Langeslag
Dutch Gem Academy

Leone Langeslag is a graduate of the Federation for European Education in Gemmology (FEEG) (2006), an independent gemmological consultant and is actively involved with the Gemma Association in Holland offering lectures and workshops. Her desire to provide accessible gemmological training in the Netherlands has lead to the formation of the Dutch Gem Academy.

Leone is a frequent visitor to international symposiums, exhibitions and trade shows where she continues her own gemmological education and passion for collecting gemstones and minerals.



Deborah Mazza
British Gem Academy

Deborah Mazza is half Italian and half British, and started her journey through the world of gemstones in Germany in 1984, where she studied at the Deutsche Gemmologische Gesellschaft attaining her gemmology and diamond diploma; she subsequently gained her FGA in 1986.

Deborah then went to work for the trade in Idar-Oberstein, buying and selling wholesale gems and diamonds, working as a gemmologist and teaching gemmology at the DGemG, this lead on to carrying out jewellery valuations for an insurance company in Germany. She later got a Bachelor in Business in Germany, and returned to the UK in 2010, where she became a tutor for the Gem-A's online courses. Deborah, keen to add to her knowledge, started to study again and passed the NAJ/IRV's CAT jewellery valuation diploma, and is now studying History of Art at Goldsmiths University. Deborah has her own valuation business and works part-time for an online auction house. She contributed several written pieces for Yavorsky's new book, Terra Connoisseur: Gemstones. She is currently the Director of Education for the British Gem Academy.



Conny Forsberg
Scandinavian Gem Academy

Conny Forsberg has over thirty years experience as a gemmologist and precision gem cutter. He received his FGA in 1986 through Gem-A, his diamond grading diploma through Hoge Raad voor Diamant (HRD) in 1994 and is an Accredited Senior Gemologist with the Accredited Gemologist Association (AGA).

He is currently the owner of the Swedish Gem AB, a modern and accomplished gem lab as well as a precision cutting facility. He has twice received 'Honourable' mention in the Gem-A photo competition for his photomicrography (2011 & 2013) and is a valued contributor to the Handbook of Gemmology, with a large collection of his photomicrographies planned for the upcoming 4th Edition. Conny is also an Accredited PRINCE2 Practitioner (Project Management), experienced in public procurement and contracting (EU law) and the initiator and organizer of the Scandinavian Gem Symposium. He is currently the auditor for the Swedish Gemmological Association.



Jan Asplund
Scandinavian Gem Academy

Jan Asplund is a gemmological consultant specializing primarily in the identification and valuation of diamonds, both cut and rough, as well as coloured gemstones and jewellery.

He received his FGA & DGA (Gem Diamond Diploma) through Gem-A in 2011, his BA

in History from the Mälardalens University in 2000 and studied geology and gemmology at Luleå Technical University (2005 – 2007), cultural and industrial history at the Uppsala University (1998 – 2000), and archival science at Karlstads University (1998 – 1999). Jan also took his Accredited Jewelry Professional – AJP (Gemological Institute of America 2011), Introduction to Watches (International School of Gemology 2012), Jewellers Education Foundation – Graduate Sales Associate (American Gem Society 2011), Blacksmithing (Sätergläntan 2002) and Silversmithing (Tärna Folkhögskola 1996).

He is a board member of the Swedish Gemmological Association, fellow and diamond member of Gem-A and initiator and organizer of the Scandinavian Gem Symposium.



Leroy Bakelmun
Gem Academy of Canada

Leroy Bakelmun started his gemmological career after receiving his certificate in gem cutting and polishing at the Lapidary Training Centre Sri Lanka in 1995. In the same year he also received his certificate in Gem Identification, through the A.K. Institute of Gemmology in Sri Lanka.

In 2006 he received his 'Gemmologist' certificate through the Canadian Institute of Gemmology (C.I.G.)

Leroy has extensive experience buying and selling gemstones. From 1997 to 2014, he owned and operated GeoGem Jewellers in Langley, British Columbia, Canada and from 2012 to 2014, he also owned the 925 House of Silver in Fort Langley, British Columbia, Canada.



Gérard Raphaël Quintin
South American Gem Academy

Gérard Raphaël Quintin is born in Paris France where he studied Art and Design and graduated from Ecole Boule. His taste for the diamond world may have been inherited from an uncle who worked in the diamond business.

In 1978 he took the gemology colored stone and diamond course with GIA

while he was mining diamonds in the Sewa River in Sierra Leone and where he started the first diamond cutting center in West Africa.

In Abidjan Côte d'Ivoire in 1992 Gérard founded the diamond cutting formation center with a gemmological laboratory 'Hardy's', followed by the installation of the colored stone and diamond cutting facilities in the jewelry school EIBMA.

Continuing his tour in the world of gemstones, Gérard went to Madagascar as an expert for a French Government project to develop the organization and skill of the gems sector.

Professor of Gemology in the Jean Guehenno Jewelry School in Saint-Amand-Montrond France, he then moved to Bolivia to fund and manage the 'Instituto Gemologico Boliviano' where students learn gemology and the art of gem cutting.

Since 1997 Gérard has been a member of the Organisation Internationale des Experts based in Geneva, Switzerland.



Cristina Rzepka de Lombas
Central American and
Caribbean Gem Academies

Cristina Rzepka de Lombas is a geologist, gemmologist, appraiser of gemstones and jewellery and an expert in diamond and coloured gemstone grading.

Currently Cristine serves on the Board of Directors of the Instituto Gemológico Español (IGE) in Madrid, Spain where she also teaches their 'Gems of Organic Origin' course.

She is also the Director of Education for the Central American and Caribbean Gem Academies.



Rahul Desai
SRDC WorldGem

Rahul Desai began his career taking forward his father's creation Shreeji Rajendra Diamond Classes (SRDC-INDIA), a pioneer in diamonds, gems and jewellery education throughout India that has graduated more than 50,000 jewellers, gemmologists, diamond traders and jewellery designers through their educational programs.

One of the first and foremost private institutions in gems and jewellery education, SRDC – INDIA received world recognition through its corporate education program in various countries including Turkey, Hong Kong, Bangkok, Myanmar (Burma), Dubai and Bostwana.



Renuka Punjani
SRDC WorldGem

Renuka Punjani has worked within the jewellery industry for nearly 25 years with a tremendous inclination towards designing and fine jewellery and has worked closely with some of the industry leaders, designing personal family fine jewellery.

World Gem Foundation Gem Academies

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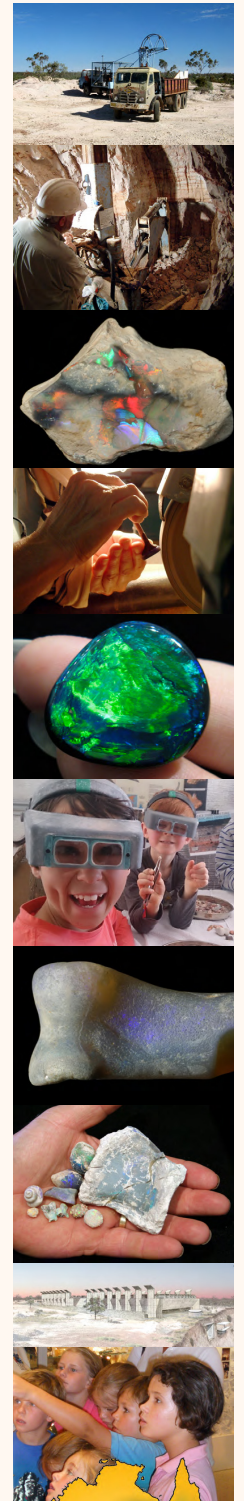
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Lisa Elser spent 25 years in IT working for companies like Bell Laboratories, NCR and Sun Microsystems and consulted to some of the largest banks and insurance companies in the world. Now she is living the dream.



Lisa Elser at Work (Photo by Laura Leyshon)

Lisa Elser is a gem cutter trained in Switzerland and living in Vancouver, British Columbia, Canada.

She spent 25 years in IT working for companies like Bell Laboratories, NCR and Sun Microsystems and consulted to some of the largest banks and insurance companies in the world.

Lisa began cutting gems as a hobby when she moved from consulting to managing consultants, finding that it gave her satisfaction to create something with her own hands.

She trained in gem cutting in Montreux and did her Graduate Gemologist degree with the GIA in Carlsbad, CA. After a number of years of cutting as a hobby she retired from IT and began cutting full time.

Lisa now works with custom goldsmiths and jewellery designers in North America and Europe.

Her work has been featured in Canadian Jeweller, More Magazine, Canadian Jewellery Business, and Jewellery Artist Magazine, and she is the winner of an American Gem Trade Association (AGTA) Spectrum Award.

Her Spectrum Award winning Tourmaline is in the permanent collection of the Smithsonian Museum.

She and her husband travel the world to buy rough gems, ensuring that the stones purchased are ethically mined and benefit local communities.

As the business grew, she and Tom began making grants to support economic development in gem producing countries.

They continue to put much of their profits into projects like wells and sanitation, grants to women's business cooperatives, and scholarships to study gem cutting and gemmology.

Deborah Mazza shared some time with Lisa to find out what really drives her forward.

DM: Why did you start gem cutting?

LE: I started getting interested in jewellery and didn't know what I was looking at, I thought there has to be a way in which a human being can tell if this stone for example is a sapphire or not, and I had no idea if this was possible or how it worked.

I was based in Switzerland then, and couldn't have enough time off work to study gemmology, which was 3 days a week whereas gemstone cutting was only 1 day. I went to class and I absolutely loved it. I left the first class with a one centimetre round brilliant cut danburite, giggling like Gollum, saying 'my precious, I'm going to keep doing this, it is wonderful!'

The job then became more stressful, and I developed this fantasy in my head in which I was going to work for a jeweller or be a jeweller, but I kept cutting. I bought some equipment, I kept cutting, kept going to classes and I never stopped loving it. It's very meditative, because the work of planning the cut is done before you even sit down.

We moved to Canada and my job was very high paying but completely awful, I was not happy. My original plan was to get my Graduate Gemologist (GG), find a jeweller/goldsmith in the city who needed part-time work from November to February and in the summer, as Vancouver has a big tourist market. Tom said I should try and see if I could sell my work because I didn't need a job, we retired from the tech industry and finished paying the mortgage. It took 3 years before I broke even, and another 3 before it started paying the bills; it was a rush to find out that people would pay money for my work. We wanted to be partners with our clients, and provide them with what they needed in their business; I won't do repairs, unless it is my piece and I really love you, so I will only provide stones for jewellery but not 'fill the holes'. Because of my design database I can let my clients know what we have in a certain range for a certain stone, priced in any currency, and I can send the pictures as needed. That is what we understand as partnership with our clients. I also do consultancy work, we discuss based on what the clients create what stones would go better with the work, shape, colour, size, helping them in what will work for them within a given budget that will still look special. We can also send them a CAD file they can import and use with their own CAD design of the piece.

That is why I do the round-tables, it requires a certain personality and relationship between the jeweller and the people invited, it is very engaging because you have to be able to talk about your work to perfect strangers. But is a great way for some jewellers to drive business, they get the gems and the follow up work. I do four shows a year, and the round tables, that's all.

DM: You mentioned meditation in your work, how does that play a part when cutting a stone?

LE: It is not that I meditate in the strict sense, it gets me to a place where I have to pay attention, but I don't have to think about what I am doing, I can't let my brain wonder because then I make mistakes. Before I cut, I will look at the piece of rough, and think, and look at the inclusions, and make my determination about what it is going to be, and then I execute. Once I make those determinations it is a physical skill, a technical execution, I can listen to music or put an audio book in. The work of planning the cut has been done and unless something goes wrong I don't have to rethink those decisions. If it chips or I find an inclusion I then have to re-plan my original thought. But I cannot let my mind wonder and worry about things, I have to stay focused on it without thinking about it, I find it very relaxing.

By and large I don't do any repair or work on other people's material, only on mine, if I do it, it can be very stressful, because if I break something it's me who broke it, it is then solely my responsibility.

DM: Tom designs the cuts; do you choose from those designs after studying the stone?

LE: Tom built me a database, and we have over 1,000 designs in it, and I can then search and choose according to the measurements I want, look for a cut that would lighten the material, or that works with a particular refractive index (R.I.). The designs that meet those criteria will be pulled up for me to scan through and see what I can use.

Maybe someone calls telling me they are looking for a particular shape and size, but we might have more than 4 designs for that particular shape, so I send over the images and let them choose.

Rough does not come perfectly shaped, so I have to bear this in mind with the addition of inclusions; I calculate on 20% yield, if I get 15% I have lost money, with 25-35% it is a bonus. So I buy individual selected pieces, and never parcels, and from what I select I usually get 30% yield, it doesn't take me any longer to cut a 5 carat piece than a 4 carat piece, but I would rather cut a 5 carat piece than smaller stones.

DM: Why did Tom decide to design cuts?

LE: Because Tom is an extraordinary human being! We've been married a long time, and always take an interest in each other's hobbies; we met at work, and are very good in keeping out of each other's way while finding ways to support each other.

He hates courses and when I was doing riding courses he had enough interest and learned enough about dressage to know what I was doing, and he learned how to recognise the difference between dirt and horse poop on the floor when I came home. Conversely, I bird watch because it is important to him; even though I don't take pictures I understand enough about photography to understand why that 500 mm lens is so important, and why he needs a gimbal arm to hold it.

But Tom started gem design because he thought he would come along on the hobby. He took a cutting class but he does not cut even though he might sometimes do a carving, because cutting is what I do; we don't want to compete with each other because one will end up hating it.

Tom is a research mathematician, so he built the database, he enjoys doing the designs and CAD; both Tom and I like to get good at things, we don't need to become perfect but good.

DM: Are you a perfectionist?

LE: No, just being good is enough. There are better cutters than me, and my clients pay me for good precision cut gems, not to spend a full day to check if my meets are good with a 10x loupe. However it is not hobby faceting standard either, it is a different universe or I couldn't make a living out of it.

I find that common maximising yield cuts do not do well as they wash out the stone, when the stone is tilted, or when worn you will see the skin or the metal from the setting because they are designed to just bounce the light off the culet when seen from the main crown table. So we started with CAD and gem prototyping to find out what looks right between colour, light movement, and scintillation, what performs well when moving the stone, because people wear gems and want them to look nice at all angles, and that is what we aim for in gems, to have a top performance in colour, a richness, and all in moving light unlike traditionally cut gems. We want to move light and retain the richness of colour from all angles.

DM: Do you have any philosophy or influences?

LE: I respect everybody I deal with, I adhere to fair trade, fair pay and avoid clients that take advantage, I give 25% of my earnings back in all sorts of ways, I don't care if people like me or not, but you will know where you stand with me, people know I'm honest and that they are getting a fair deal with me. I have a supportive community, a good network of people, and a very good opinion of the gem industry nowadays, which was proven to me when Tom got ill.

DM: Your view of craftsmanship versus art?

I describe myself as a technician with an excellent set of aesthetics, not an artist, Victor Tuzlukov, Dalan Hargrave and others are artists, I can take a design and improve it, change a design to fit the gem, keep its integrity, through technical skills. There is a difference between genius and brilliance, I have no genius spark, and never try to convince people that I am an artist, I am brilliant but not a genius, and confess to having an impostor syndrome.

I was asked by 'Somewhere In The Rainbow', amongst 11 cutters of various styles, to cut a piece of synthetic sapphire as an artist/cutter in the 15th century, for the exhibition held in Tucson this year.

I sat down with Tom in front of a picture of the original blue sapphire acquired by SITR, and we created a design that reflected the original piece, we wanted to do something that would reflect the original artist's style, with our own style, it has that same bicycle seat egg shape, a pavilion to drive the light and an almost brilliant cut crown. At the opening reception I was on a par with all these other famous cutters, such as Victor Tuzlukov, Meg Berry, etc., and I felt good, I felt I belonged

there, that I am appreciated as a woman coming into this industry after years in the tech industry.

DM: I noticed at the Round Table different cuts now to the cuts I saw a few years back, what do you see in a stone before and after the cutting process?

LE: A decision we made long ago is we don't want to be involved in world gem domination, we don't have to put a kid through school, don't have to pay a mortgage and I don't want a day job anymore. We change our designs and rotate them periodically, so I don't do the same thing all the time, and I rarely cut more than five or six of a given design in a given period of time. I want variation for myself, and the best thing for the rock. I love rough gemstones, if I can't look at a piece of rough and quickly see what it wants to be, I don't buy it. If I have to talk myself into a bad shape of rough it is not a good buy. So what I see in the rough is usually very close to what I see in the finished piece. I've sometimes been wrong, once I was sure about a garnet, red stones are brutal to identify in the rough, but it turned out to be a ruby! So I sent a bonus to the broker, and he sent some money to the original seller. Sometimes we create a new design for something particular like the SITR sapphire, the Smithsonian stone is also a new design.

DM: What gives you the most satisfaction?

LE: Seeing how people react when they see a stone I have cut.

DM: Are some stones more difficult on the lap than others?

LE: Citrine is no problem, a single piece gave me a 52% yield once, and I can cut it free hand; a colour change garnet, I cut it with a 3000 lap, so pre-polished to make sure I would get the best yield. Gems aren't like metal, and whatever decision I make, I take my time especially with expensive pieces, so if they are not on the altar (Lisa is a practicing Buddhist) they might sit on my bench for some time. I might as a warm up exercise try the design on a lesser value stone to see how it works out, as a sense of obligation to the rock. I have destroyed stones and indexed wrongly the second stone I ever made, so I might put them on my altar prior to cutting only when I'm terrified of them. I only cut about 400 stones a year, so I am not out for real gem domination, I want to have a good time, make the best thing I can, and cut for personal satisfaction.

DM: You mentioned you price with GemGuide, source ethically and give back to the community?

LE: A thing is worth what it is worth, even if you put 1,000 hours into it, it will still be an almandine garnet. Your mum might pay more because you made it but no one else will. What influences my cutting decisions is if the piece is worth

my time, and if I can get value for my time. I am working with an ethical cutter in Sri Lanka who will use my designs, who has modern equipment, and who is getting a fair wage. I pay fairly and feel good because I have something done ethically in my inventory. I'm a small artisan, I don't know who mined and I might never see them, so building wells, supporting schools, giving to women's communities, giving medical equipment, and everything else I can do to make the community better, is how I hope will allow the miners to make different choices.

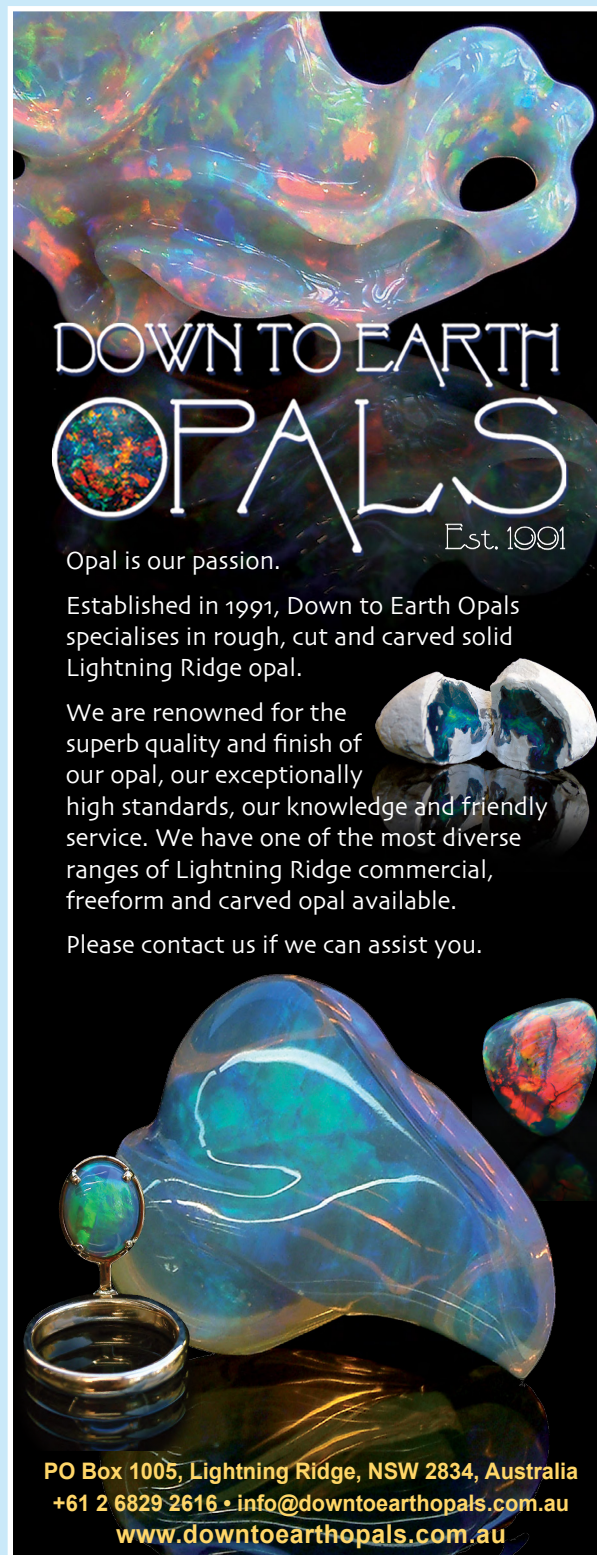
I can only do this within standard wholesale pricing, I don't have a margin for my cutting, but if someone wants to commission a piece with my name, then I have to factor a margin in, because I am not cutting from or for my own inventory. From my own inventory pricing is from GemGuide; standard wholesale.

DM: Do you have any long-term plans?

LE: I am living them, this is the retirement career. I hope to be doing this until I can't see the lap. I like what I'm doing, if I don't have a job I start chewing my shoes, it gives me a focus, something I can do that allows us to fund our travels, and Tom's incurable cancer. I am living the dream.



Lisa & Tom (Photo by Laura Leyshon)



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Blue Tourmaline 8.17cts (Photo by Karlyn Bennett)



Rhodolite Garnet 9.50cts (Photo by Karlyn Bennett)



Green Grossular Garnet 3.26cts (Photo by Karlyn Bennett)



Yellow Grossular Garnet 2.98cts (Photo by Karlyn Bennett)

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LEONE LANGESLAG is the CEO of the Dutch Gem Academy and owner of Sole Leone. She received her European Gemmologist (E.G.) diploma from the Federation for European Education in Gemmology (FEEG) in 2006.



Sphalerite & Paella

You could certainly be forgiven if the name 'Sphalerite' does not immediately roll off your tongue. It's difficult to say, difficult to spell and difficult to find. However for gem connoisseurs, sphalerite (Esfalerita in Spanish) is a 'true' gem, admired for its intense fire that gives stones an almost 'surreal' appearance when cut correctly. Derived from the Greek word 'sphaleros', meaning deceiving or treacherous, sphalerite is often mistaken for other gemstones due to its relative obscurity.

Sometimes referred to as 'Zincblende', sphalerite is a zinc sulphide mineral with a chemical composition of $(\text{Zn},\text{Fe})\text{S}$ that is mined specifically for its zinc content; an important metal that has many different industrial applications. Typically sphalerite is opaque due to the high amount of iron in its composition and is often called 'Marmatite'. 'Cleophane' on the other hand, is the transparent variety that has a low-iron content and is suitable for cutting. However finding 'Cleophane' in cuttable sizes is difficult.

Sphalerite is found in metamorphic, igneous and sedimentary rocks throughout the world (Australia, Bolivia, Canada, China, Mexico, India, Peru and the USA) and is usually associated with dolomite or calcite but can also be found in association with pyrite, fluorite and quartz.

Gem quality transparent sphalerite occurs in many distinct colours and forms including brown, red, orange, yellow and green. Due to its low hardness and lack of transparency, caused by the iron impurities, gem quality sphalerite is hard to find and therefore seldom seen in jewellery stores. However, when faceted, its outstanding optical properties make it a spectacular gem for collectors.

The Las Manforas mine, whose historical name was La Almanzora or Aliva, located in northern Spain produced the finest quality 'toffee' coloured transparent sphalerite but ceased production in 1989. Today, a majority of gem quality sphalerite (greenish and brownish) comes from Bulgaria but the quality does not compare to its Spanish counterpart.

Physical and Optical Properties

Sphalerite is isometric (cubic crystal system) and is most commonly found as tetrahedral crystals, twinned and grouped together, with perfect cleavage in 6 different directions. This combined with its low hardness (3.5 to 4) makes faceting sphalerite quite a challenge!

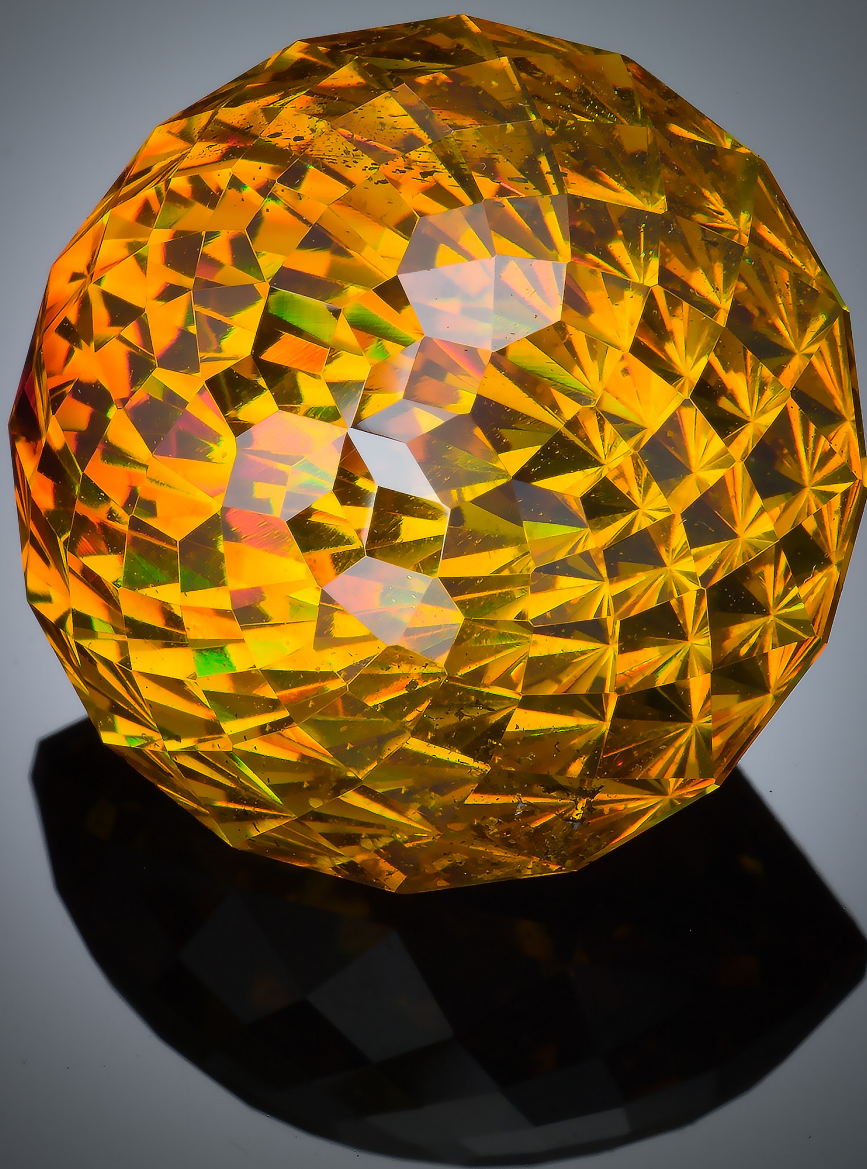
The specific gravity of sphalerite is similar to corundum (3.9 to 4.2 depending on the iron content) with an R.I. (refractive index) of 2.369 almost as high as diamond (2.42).

The most interesting optical property of sphalerite is its high dispersion, almost 4 times greater than diamond. It is the dispersion; defined gemmologically as the difference in the R.I. between the 'B' and 'G' Fraunhofer lines (686.7 nm and 430.8 nm) that gives sphalerite its extraordinary fire.

One other interesting characteristic of sphalerite is its complex colour zoning, which are responsible for the fascinating colour effects. Spectroscopically, most orange stones have three absorption lines at 690, 667 and 651 nm.



Suite of Sphalerite (Photo by Egor Gavrilenko) (Courtesy of Gem-Sphalerite.com)



Sphalerite cut by Egor Gavrilenko (Photo by Tino Hammid)

Colour

The range of colours includes black, brown, grey, yellow, red and orange. Colourless stones are very rare while some specimens contain crystals of different colours. In the coloured varieties, green sphalerite is the rarest and is therefore more valuable than fine red and orange sphalerite. The most typical sphalerite from the Aliva mine has a toffee colour and is referred to as 'toffee blende'.

The curious thing about sphalerite is that highly saturated colours are more common than those with low saturation levels and this is contrary to the majority of coloured gemstones. For collectors, greens, greenish yellows and yellows are more desirable since they exhibit more fire while in brown, red and orange stones, the intense body colour tends to hide the dispersion.

Clarity and Inclusions

Due to its rarity, buyers will usually accept some inclusions in sphalerite. Common inclusions include multiple fluid inclusions, fingerprints or feathers with the two-phase liquid-vapour fluid inclusions the most common. Most faceted stones will contain some veils or fissures that are visible to the naked eye since inclusion free sphalerite is very rare. Consequently the value of sphalerite can differ greatly depending on the degree of inclusions.

Cut

Due to its perfect cleavage (in 6 different directions), low hardness, heat sensitivity and brittle nature, cutting sphalerite is extremely difficult. Next to faceting, polishing is important in

order to deliver the best brilliance. The most common cuts are rounds and squares but also fancy cuts such as trillions are cut.

Synthetics, Treatments and Imitations

Synthetic sphalerite does exist but most stones are used for industrial purposes.

A possible imitation of sphalerite is synthetic zincite but due to its different physical and optical properties, it is easily identifiable provided care is taken while testing the stones.

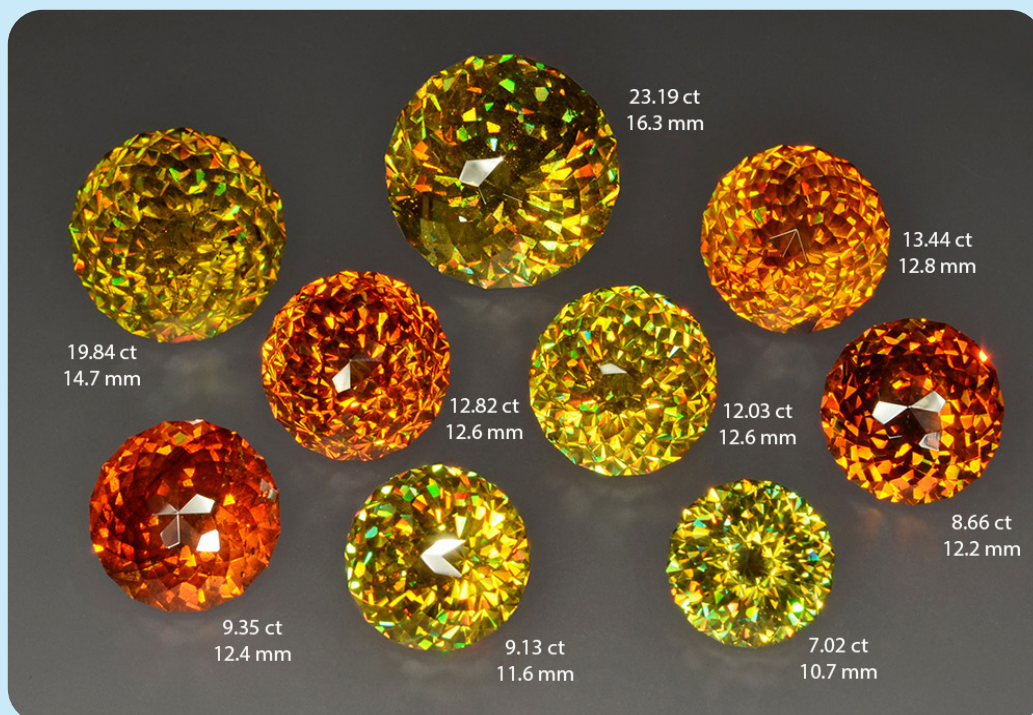
Another rare gemstone that can be confused with sphalerite is cassiterite, which also has high dispersion and can occur in yellow, brown, green, and red colours. However due to the fact that cassiterite is even rarer than sphalerite, it is entirely possible that you might misidentify sphalerite as cassiterite. In terms of treatments and enhancements, no known treatments exist.

Conclusion

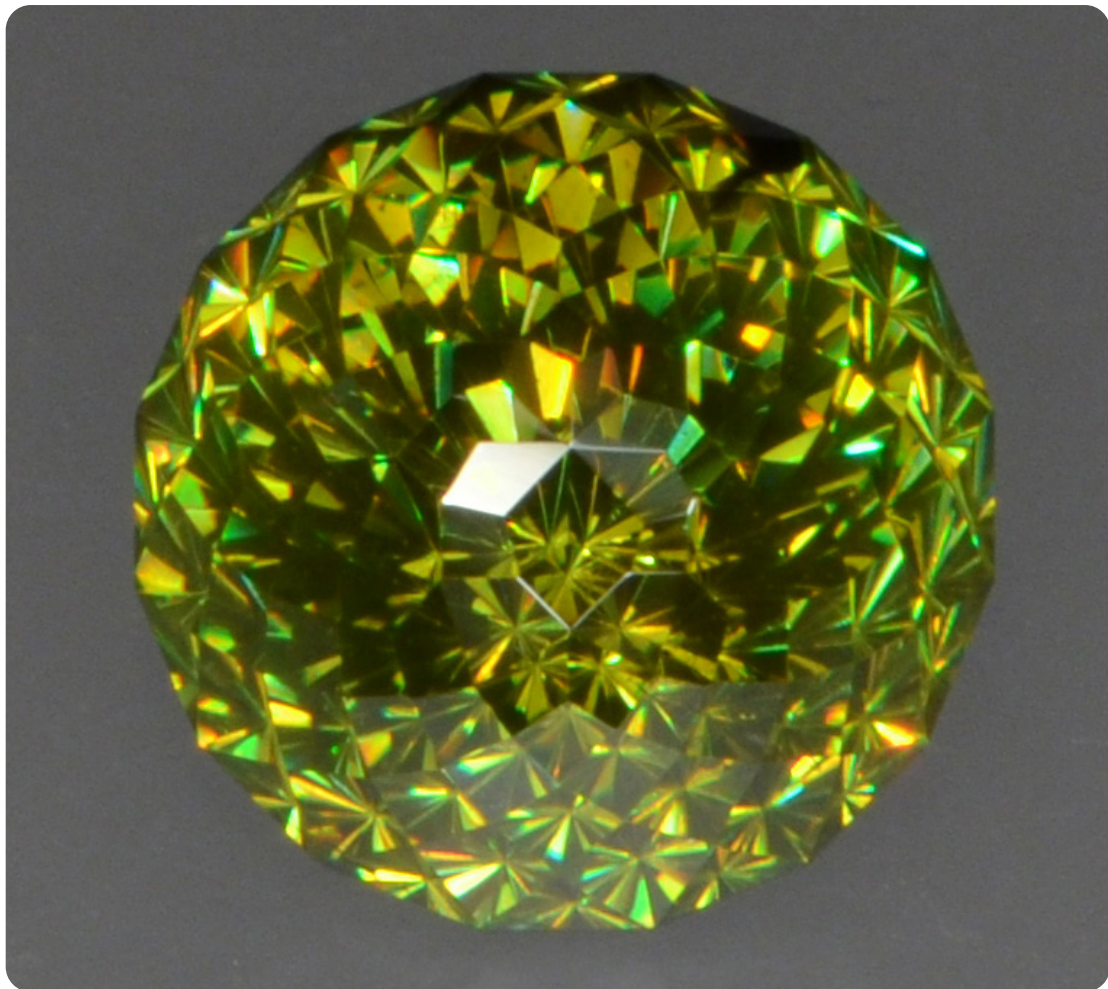
Nature often brings us such rare and beautiful things and sphalerite is no exception. It's gorgeous, unique and exciting and definitely deserves to be standing in the spotlight!

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Selection of Sphalerite (Photo by Egor Gavrilenko) (Courtesy of Gem-Sphalerite.com)



Green Sphalerite 13.88cts (Bulgaria) (Photo by Egor Gavrilenko) (Courtesy of Gem-Sphalerite.com)



Sphalerite 131.91cts (Photo by Egor Gavrilenko) (Courtesy of Gem-Sphalerite.com)



Two-Phase Inclusion (Photo by Egor Gavrilenko) (Courtesy of Gem-Sphalerite.com)



Veil-like Inclusions (Photo by Egor Gavrilenko) (Courtesy of Gem-Sphalerite.com)



Sphalerite Dream Collection by Lisa Fraccia (Photo by Lisa Fraccia)



Sphalerite Dream Collection by Lisa Fraccia (Photo by Lisa Fraccia)



In 2018, the World Gem Foundation will award five scholarships allowing deserving students to take the World Gem Foundation theoretical 'Career Gemmology' course.

Tino Hammid Memorial Gemmological Scholarship



In every industry there are iconic individuals, giants who stand head and shoulders above the rest. In the field of jewellery and gemstone photography, there is little debate that Tino Hammid was a visionary, a rare talent who possessed the unique ability to capture the true beauty of gemstones. For almost forty years his photography adorned the pages of every important publication around the world, showcasing his unrivalled ability to inject realism into his work.

Tino started his career as a staff gem photographer at the Gemological Institute of America (GIA) in Santa Monica, California (1980 to 1982). In 1983 he started his freelance career in gem and jewellery photography and began a 25-year association with David Federman providing photographs for Modern Jeweler's monthly Gem Profile column. During this period they jointly won two Jesse H. Neal awards from the Association of Business Publishers. In 1987 he acquired Christie's Auction house as a client and photographed more than a hundred of their jewellery sales catalogues.

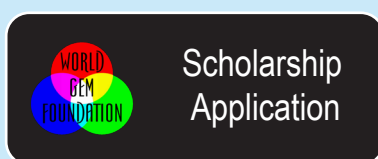
In 2012, Tino joined forces with gemmologist Geoffrey M. Dominy and provided the exquisite photographs for The Handbook of Gemmology, the first digitized gemmological textbook released in 2013.

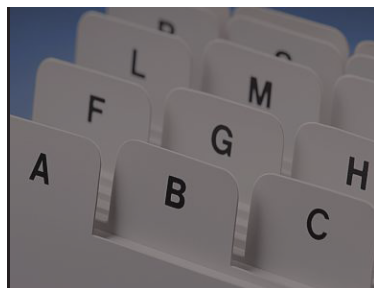
Sadly, Tino passed away in 2015 after a two-year battle with cancer, however through the Handbook of Gemmology and now the World Gem Foundation courses, his legacy and monumental contribution to our industry will live on for future generations to appreciate and admire.

In 2018, the World Gem Foundation will award five scholarships allowing deserving students to take the World Gem Foundation theoretical 'Career Gemmology' course.

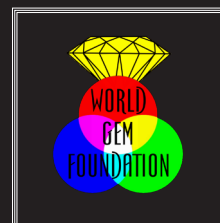
The deadline for submitting your application is December 31st, 2017. All applications will be judged by Tino's wife Petra and his oldest daughter Evelyn with the mandate to select those five candidates who, in their opinion, best epitomize the spirit of Tino.

To download the application form, please click on the image below:





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