

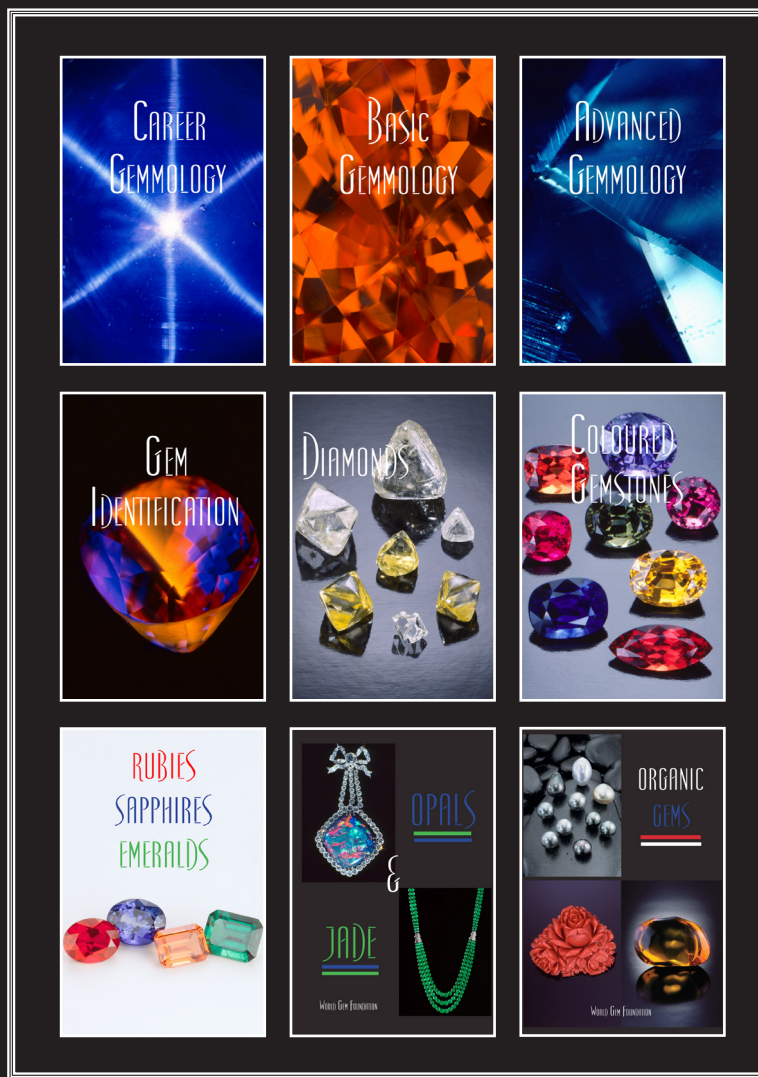


Gemmology Today

December 2018
Quarterly Publication



Melo - Yellow



A comprehensive gemmological program
for tomorrow's gemmologists

Three 'Diploma' programs

- Career Gemmologist
- Diamond Professional
- Coloured Gemstone Professional

&

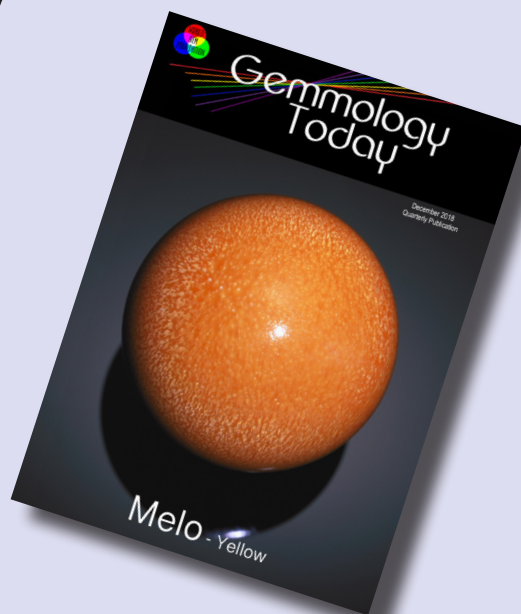
Nine exciting and dynamic courses
covering all aspects of gemmology

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

WORLD GEM FOUNDATION

In this issue

MEN IN GEMMOLOGY - Interview with Torbjörn Lindwall, founder of Gemometrics AB	5
GEMMOLOGY TODAY GEM QUIZ #9 - Let's see how much you know about Garnets? Fifteen Questions, No Time Limit, No Pressure	10
SMART THINKING - 'Gems on the Blink - The Polariscope' by Kirk Feral	11
SPICE OF LIFE - 'Sunstone - All that Glitters' by Leone Langeslag	15
CARBON COPY - 'Early Russian Diamonds' by Jan Asplund	19
MONEY CENT\$ - 'Copper - Penny for your Thoughts' by Geoff Dominy	22
FINGERPRINT FILE - Review of the new GemPen® by Geoff Dominy	28
THROUGH THE LENS - Interview with gemstone and jewellery photographer Arjuna Irsutti	34
TOOLS OF THE TRADE - Review of the EXA Gem Instrument by Peters Brangulis and Egor Gavrilenko	48
THE DAILY GRIND - 'Chasing the Light' with Jean-Noel Soni & Nicholas Yiannarakis by Deborah Mazza	54
WORLD GEM FOUNDATION WORKSHOPS & COURSES	56
MEET THE TEAM - The faces behind the World Gem Foundation	74
EXPOGEMA 2018 - A pictorial review of IGE's trade show in Madrid, Spain by Geoff Dominy	78
TINO HAMMID MEMORIAL GEMMOLOGICAL SCHOLARSHIP	84
ACADEMY DIRECTORY & CONTACT INFORMATION	85



Cover Photograph by Tino Hammid

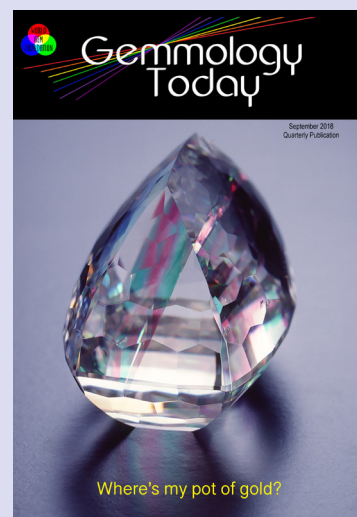
Published by The World Gem Foundation & Amazonas Gem Publications

Editor Geoffrey M. Dominy

Advisory Council Leone Langeslag, Conny Forsberg, Jan Asplund, Leroy Bakelmun, Cristina Rzepka de Lombas, Gérard Quintin, Kyalo Kiilu.

Copyright 2018 - World Gem Foundation

No part of this publication may be reproduced, stored in a retrieval system or transmitted in any form or by any means electronic, mechanical, photocopying, recording or otherwise without the prior written permission of the publisher. Any opinions expressed in this publication are understood to be the views of the individual contributors and are not necessarily those of the publishers.



September 2018 Issue



Editor — at Work

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



Donovan Live (Photo by Geoff Dominy)

On October 27th, I had the rare opportunity to buy one of only fifty tickets for a private Donovan concert at the House of Robert Graves here in Mallorca. Donovan spends part of the year on the island and offered to do a benefit concert to raise money for the Robert Graves Foundation. I have to say it was a unique event and one that I will certainly remember for a very long time. Donovan was an iconic figure in the 1960's and was one of my favourite artists. He also sang a duet with Alice Cooper on the album Billion Dollar Babies, singing the falsetto on the song of the same name. This is something that I did not know and having listened to the song hundreds of times, I was amazed that I never realised it was Donovan. It's funny because now I know, it seems so obvious, a little like gem identification. When you know what you are looking for, all the pieces seem to fall into place. I sent his publicist a copy of the cover to this issue since it had been finalised back in September. The first thing that popped into my head when I saw the Melo Pearl was Donovan's song Mellow Yellow! I am sure Donovan never imagined that his song would inspire the cover of a

gemmological publication but it is yet another example of how music permeates our lives.

The underlying theme of this issue is 'New Technology'. In addition to an interview with Torbjörn Lindwall, the developer of GemPen®, there is also a review of the instrument along with tests conducted by Egor Gavrilenko and myself and a review by Egor and Peters Brangulis of the EXA machine developed by MAGI Instruments.

Whether we like it or not, the playing field of gemmology is changing rapidly and without companies such as Gemometrics or MAGI, we simply will not be able to detect the large numbers of lab-created diamonds that are now available in the marketplace. This is not to say that traditional gemmological instruments will become obsolete but unless you are using specialised equipment when dealing with lab-created diamonds and treated and enhanced gemstones, you are running a very high risk of making a mistake that could not only affect your professional standing in the gemmological community but also have severe financial implications.

This issue also includes articles on early Russian diamonds by Jan Asplund, Kirk Feral's step by step guide to making your own polariscope, an interview with acclaimed photographer Arjuna Isrutti, Deborah Mazza uncovers two talented faceters; Jean-Noel Soni and Nicholas Yiannarakis, Leone Langeslag provides a ray of sunshine by looking at one of my favourite gemstones; sunstone and I look at the importance of copper as a transition element. Lots to digest this festive season!

Once again a big thank you to all our contributors and you, our readers, for making Gemmology Today such a success!



The founder of Gemometrics AB is gemmologist and geologist Torbjörn Lindwall, who for more than 20 years has worked with identifying and valuing Gems and Jewellery for Companies, Authorities and Private clients all over the world.

Meet Torbjörn Lindwall



Torbjörn Lindwall

Earlier this year I was asked by Gemometrics AB to test their new GemPen ®. I have always admired inventors, especially those engaged in the field of gemmology. The future of our industry relies on people such as Torbjörn because without them, we simply would not have the necessary tools to navigate the complicated world of lab-created and treated/enhanced gemstones.

GT: Who is Torbjörn Lindwall and what sparked your interest in gemmology?

TL: I am a geologist and a gemmologist with FGA and DGA membership from Gem-A for almost 24 years. I received my Gem-A fellowship (FGA) in 1996 and added the Diamond membership (DGA) in 2005 in conjunction with winning the Deeks Diamond Prize for best examination that year.

I used to work as a teacher, being responsible for the quality of education at Kristallen in Lannavaara (in the Arctic North of Sweden) – an institution offering education in cooperation with Gem-A. Kristallen have conducted educational courses in collaboration with Luleå University of Technology for over fifteen years and is also one of 24 ATCs (Allied Teaching Centers) for Gem-A. Since 1996 I am an approved tutor for Gem-A, and I have been teaching the Gem-A Diamond courses since 2006.

I have worked on multiple prospecting projects towards the extraction of precious metals, both in the Scandinavian countries and countries like Ghana and Sierra Leone. I have also worked on prospecting projects aimed towards the extraction of precious gemstones mostly in West Africa, East Africa, Scandinavia and Greenland.

My interest in gemmology has been with me for as long as I can remember. When you think about it, almost every child has an interest in gemmology and geology. They pick up and collect stones. I was no exception. What is it that is so fascinating? Is it the colour or the shape? I think it is a deeply rooted interest within human beings to have an interest in these kinds of things. Looking back to prehistoric times, knowing your surroundings was a question of survival.

As a child I especially remember visiting my first mineral convention, I was seven years old.

The interest grew, especially when I first came into contact with gold panning. I started to wonder about what kind of minerals you should look for when searching for gold and I was interested in the reason why some minerals could be found near gold.

So I started to study geology 'for real' and I was working on a gold prospecting project. I drove by the gemmology institution Kristallen in Lannavaara. I just saw the sign and got curious. I pulled off the road, went in and after a conversation with the founder I made my decision. I travelled back home to Skåne some 2,000km south in Sweden, packed my things and moved up to Lannavaara to study gemstones.

The education lasted for two years. My initial thought was 'I am going to get my education, learn everything I can and then I am going to work with stones'. After my two years of education I got a job offer as a teacher. 'Okay' I thought, 'I'll try it for one year'. 'Ha!' I ended up working there for 14 years!

GT: What was the defining moment that motivated you to invent the GemPen?

TL: I was working in West Africa. If you are going to buy gemstones directly from the local buyers, then you can forget about taking the stones to a lab for identification and validation! You need to make your decisions there and then, using your own knowledge and judgment. If you are insecure and you refrain from buying, you will either have passed on a bad deal or missed a favourable deal. The worst-case scenario, when buying directly from the local buyers in the field, is that you can get completely scammed.

In 2008-2009 when I was in Sierra Leone, I noticed something strange happening in the local market. Foreigners had penetrated the local market and with the help of rough stones as templates for mould-framework, they manufactured stones in high refractive glass. The results were nice, realistic looking, but fake, 'diamond crystals'. They were whole, clean and of a good colour. It was easy to get duped by these crystals. There also started to emerge carved topaz-crystals looking quite realistic. Seeing these types of fakes I immediately thought 'this is going to be a problem'.

At the same time, in Sierra Leone I got to know the locals and noticed they were not treated well by the foreigners, who more or less had come and started a cartel over the gemstone trade there. They paid the local people doing all the hard work very poorly. So, I started giving courses to locals on how to validate and appraise raw diamonds. That

way the people could tell how much their work was actually worth. This of course led to buyers (the cartel) needing to pay more for raw diamonds. Needless to say, I was not very popular amongst the cartel at the time. But I did not care, I wanted to make the marketplace fairer. There should be more fair play and justice; I do not think that the 'big guys' should take advantage of the 'little guys' that are doing all the hard work. For me it really was a defining moment. To see the whole community change for the better because they now had the knowledge of what their work was worth. I got to know a lot of people. Especially one man who became my good friend, he had a very poor life, but now all of his children are in school, one of them even went off to study in London.

Those two moments in Sierra Leone really were defining moments for the creation of GemPen®. Seeing all these new fakes and seeing what increased knowledge could do to better the market. I still have a vision to go back to Sierra Leone in order to teach more people and to give knowledge in order to make the place a little better and a little fairer.

GT: What challenges did you face in bringing GemPen from a 'Conceptual' idea in your mind to a 'reality'?

TL: An idea started to grow of a device solving the problems with fakes while also providing instant insights. A device that gave instant results, was portable, reliable and easy to use. I realized that the only thing that would do the job was a light source of some sort and I choose to look more closely into UV-lights, a well-known technique that I found ways to develop and improve upon, using what I had already learned in the field, but also using my technical know-how. The first prototype was a piece of sophisticated lab equipment, covered by a toilet roll and duct tape. It worked and it did the job but maybe it did not look so nice. It was also a fire hazard and so it did not exist for very long. The



GemPen® in Case

next step seemed obvious; to look at tougher materials that could withstand all types of weather and environments without the results being compromised. The technical problem was to get the filter and light source to work smoothly together. Thankfully I am just about as persistent as I am curious so giving up was not an option.

My first idea was that GemPen ® should only work on diamonds. But as it turns out it works on sapphires and rubies as well. It will probably work on several other gemstones and we now continuously test new filters and new technological applications for GemPen ®. I have to say we are also very appreciative from all the feedback we get from industry friends and colleagues.

After a few years, we had finally developed a product that worked. GemPen ® now is far more superior in both technology and design than my toilet roll prototype and it works both in the hands of a gemmologist, a rough stone buyer or a jeweller.

We really hope that GemPen ® will change the dynamics of the gemstone market and make it harder for the swindlers out there. I am sure of it, but I do understand that there may be initial scepticism within the gemstone industry.

GT: What inspired the design of GemPen. Was this purely for esthetics or for functionality?

TL: I had a basic idea of what I wanted the design of GemPen ® to be. I knew it needed to be small and portable. Fortunately for myself and Gemometrics AB, we managed to get an award winning designer, David Doms, onboard. Together we took GemPen ® from a concept into an actual product. And I learned so much from working with a proper industrial designer.

To give some insight, we composed tasks and solutions such as:

- Usability and feature quality is key (Operation / Light Source / Filters).
- Create a product that is easy to use (Filter Change / Power Switch / Grip).
- Create a product that is easy to carry (Portability / Cover).
- Create shapes and surfaces that make features intelligible (Grip / Power Switch).
- Create shapes that enhances the functionality (A hexagonal shape is easy to grip and does not roll).
- Create a design idiom that tells a story (A hexagonal shape relates to crystalline structures).
- Graphics and text, including warnings, should be a part of the overall design idiom.
- Minimize the number of components through smart design (No buttons).

- Use quality components (Aluminium casing, long-lasting battery, custom made durable light source).
- Implement a smart process where the product, the travel case/darkroom, the packaging as well as the brand are developed simultaneously.

In summary, we have strived to create an amazing user experience by developing the right features with an elaborate and easy to use design.

GT: I am impressed with the packaging and the overall quality of the GemPen. There must have been the temptation to produce the GemPen in Asia to reduce costs. Why did you decide to manufacture it in Sweden?

TL: For us, it is all about creating the best user experience with the utmost quality. This in turn calls for proven solutions, high quality components and secured manufacturing methods. We source from Sweden as well as Asia and America, but for processing, final assembly, testing, etc. we have chosen to do this close to home. It just felt natural and important to be close to where GemPen ® is made and this way we can have a close relationship with the assembly. Quality and consistency is everything for gemmologists and therefore also for Gemometrics AB.

GT: Without giving away all the 'trade secrets', what can you tell us about the 'mechanics' of the GemPen?

TL: GemPen ® is easy to use, portable, durable and gives instant results. It utilizes USOF (Ultra Spectrum Optical Filtering) technology, which gives consistent gemstone indication results. GemPen ® is not merely a UV light, but utilizes a filtered, broad spectrum technology which showcases unique fluorescence effects in gemstones, distinguishing it from traditional UV testing devices. The development of new filters, tests and new applications is a work that is never ending.

GT: Jewellers are always looking for that 'magical black box'; gem identification at the flick of a switch. What advice would you give to users of GemPen?

TL: I would tell them that there is no 'Magic Black Box' and that there probably never will be. We will always need gemmologists. The techniques for developing man made gemstones and treatments of synthetic or natural stones are constantly being developed and improved upon.

GemPen ® is a compliment for the decision-making process that gives indicative results. It will help you when buying, trading or studying gemstones, but it should not be the sole determining factor.

As with every other instrument out there, GemPen ® requires some practice in order to interpret the results the right way. But the more you practice, the more useful GemPen ® will be for you. For example, if you have ever used a refractometer, you know that if you use it the right way you can get a lot of valuable information from it. Just because you own a guitar it doesn't mean that you can automatically play it; practice makes perfect. But I would say that GemPen ® doesn't require as much practice as a guitar, especially if you are already familiar with gemstones.

GT: The marketing of the GemPen is quite unusual using 'Influencers' to test the device and post their findings on social media. Clearly this shows great self-confidence and belief in your product. Why did you choose this marketing strategy and did you have any reservations about using this approach?

TL: Of course, we believe in GemPen ® and what it can do. But it is extremely important for us to stay humble particularly towards the high demands among gemmologists. It's easy to become blind to your own product, so it is very helpful for us to get the perspective of 'new' albeit knowledgeable eyes. To have cooperation together with gemmologists around the world seemed obvious to us.

It is not only a marketing strategy, but also a genuine way to see what other gemmologists, a big part of our market, think of the product. With their feedback we can improve GemPen ® and everything around it, such as the instructions and how we present the product. If we do not take on and learn from the potential criticism, we cannot make progress and we will be doing ourselves and everyone else a disservice.

GT: Define the market you are targeting and why GemPen should become an integral component of any gemmologist's identification toolbox.

TL: GemPen ® is to be used throughout the whole value chain. While developing GemPen ® it was important for us to keep that perspective. You can use it on the go, in the field or at the office. It works on rough, polished and

mounted goods and has no size limit. Best of all it is time saving. You can make that initial scan of a whole batch of gemstones in a matter of minutes. There is no need to perfectly place each stone in a certain way and wait for results. Just pour the gemstones on the table or in the portable darkroom and just scan them. Accordingly, GemPen ® is a great companion near the mines when handling rough stones, when dealing and trading with stones and, for jewellers sourcing as well as for the second-hand trade.

We do recommend that the GemPen ® user is a professional gemmologist and that is indeed our target market. However, who are we to decide who will or will not find GemPen ® useful in their work, hobby or trade? If you understand how GemPen ® works and how the process of validating stones works, including that you cannot base your entire decision on one tool and that you need to gather more data and information in order to know and make an informed decision, who are we to stop you from using GemPen ®?

GT: Twelve months from now, what would you say would constitute a great year for you professionally and Gemometrics in general?

TL: We hope that the market has at least begun to understand what GemPen ® is and how it works. Especially great would be to see where we have helped people from being swindled. We are also working on new filters and we hope that we can add more gemstones for GemPen ® to work on. A great year would be if we get the industry to talk about the gemmological challenges that exist today, to get out the message and understanding that it takes more work and research to know the origin of your precious stone.

Copyright

All images copyright of GEMOMETRICS AB



GemPen ®

GemPen®

Gemometrics



Natural, treated or synthetic?

GemPen® is a new portable tool for screening gemstones in the field.

Works for rough, polished and mounted stones of all sizes.

Screen parcels in seconds.

www.gemometrics.com

Swedish Gem (L)AB

Accomplished gemological laboratory

www.gemology.se

+46 70 308 44 14



Gemmology Today Quiz #9



Let's see how much you know
about Garnets?

CLICK ON THE IMAGE TO START

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.

Gems on the Blink - The Polariscopes

For identifying transparent and translucent gems, a polariscopes is a simple tool that allows us to see how light travels through a gem. We can use this device to determine whether a gem is isotropic (singly refractive) or anisotropic (doubly refractive). The key components of a polariscopes are the two identical polarizing filters or lenses, one of which is referred to as the polarizer and the other as the analyzer.



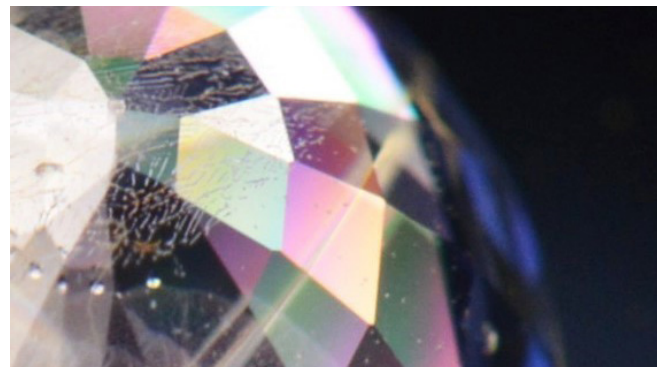
Polarizing Lenses

A gem is placed in between these lenses, with a strong light source positioned below the polarizer (bottom lens). The analyzer (top lens) is rotated to the crossed polars position at right angles to the polarizer. In this closed position, the polariscopes goes dark, with no visible light reaching the eye except the light passing through the gem. The gem is then rotated face down and also on its side. The reaction we observe tells us whether the gem is:

1. **SR:** Singly Refractive; the gem appears the same as it is rotated under crossed polars (doesn't blink light to dark); if the polarizing lenses are rotated away from crossed polars to an open position, the gem appears lighter.
2. **ADR:** Singly refractive but shows anomalous double refraction (ADR) due to internal strain; irregular areas of light and dark swirl through the gem as it is rotated under crossed polars; if the polarizing lenses are rotated away from crossed polars to an open position, the gem appears lighter.
3. **DR:** Doubly refractive; the gem blinks light to dark as the gem is rotated under crossed polars; if the polarizing lenses are rotated away from crossed polars to an open position, the gem appears the same or darker.

4. **AGG:** Doubly refractive but doesn't blink light to dark due to an aggregate (AGG) internal structure of microcrystalline crystals; light scattering off the microscopic or submicroscopic crystals causes the gem to remain light as it is rotated under crossed polars; if the polarizing lenses are rotated away from crossed polars to an open position, the gem remains light.

With the additional help of a conoscope (a glass sphere at the end of a glass rod), we can use a polariscopes to determine the optic character of a gem i.e. whether it is uniaxial or biaxial. In order to see uniaxial and biaxial optic figures through a conoscope, spectral interference colors must be visible somewhere on the surface of the gem when the polarizing lenses are set at crossed polars. A low-power magnifying lens such as a watchmaker's loupe set on top of the analyzer lens magnifies optic figures so that they're more visible.



Interference Colors under Crossed Polars

A polariscopes has some limitations when it comes to distinguishing double refraction from single refraction. We may see no reaction or an ambiguous reaction when:

1. The gem is opaque.
2. The gem is heavily included and appears AGG under a polariscopes.
3. The gem shows an unexpected reaction or anomalous double refraction (ADR) under a polariscopes.

In such cases, we can use other tools to confirm how light travels through a gem.

Alternate Tools

We can use a dichroscope to double-check our polariscope results. A dichroscope is designed to reveal pleochroism in transparent and translucent gemstones. If the dichroscope reveals more than one gem color, then we know the stone is doubly refractive. However, a dichroscope can't show pleochroism in very pale or colorless gems.

Another instrument that can be helpful in determining whether a gem is singly or doubly refractive is the refractometer. As the polarizing lens on the refractometer is rotated, any birefringence indicates the stone is doubly refractive.

A refractometer can also be useful for determining the optic character of a gem. If no gem interference colors are apparent under a polariscope, which is often the case, we must turn to the refractometer. Four sets of R.I. readings are taken while the gem is rotated on the refractometer.

But a number of factors can make it difficult or impossible to determine optic properties using a refractometer:

1. The birefringence is very slight and difficult to detect.
2. The optic axis of a DR gem is parallel to the field of view (perpendicular to the table facet), making a faceted gem appear singly refractive (no birefringence) as the gem is rotated face down on the refractometer.
3. The gem material is rough or in cabochon form with no flat polished surfaces available for detecting birefringence with a refractometer.
4. The refractive index (R.I.) of the gem is over the limit of the refractometer fluid i.e. over 1.81

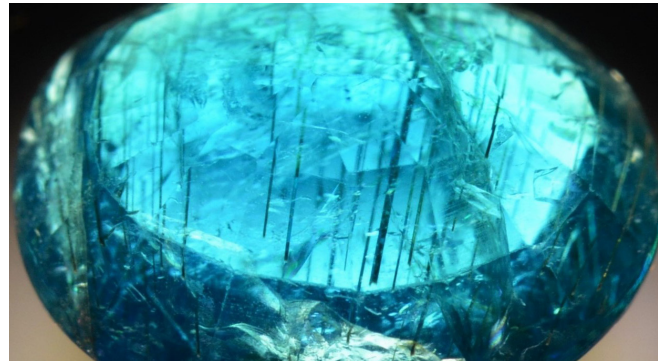
In all these cases, a polariscope is our ace in the hole as we attempt to identify a gem.

Polariscope Versatility

A handmade polariscope can also be used as a darkfield and as an immersion cell.

A polariscope set at crossed polars can serve as a darkfield attachment for a microscope when we wish to view features that may help us identify the gem such as inclusions, surface features or unequal distribution of color. Because visible light is transmitted only through the gem under crossed polars, inclusions and other gem features stand out while the surrounding environment remains dark.

A polariscope under a microscope (polarized microscopy) can also reveal interference colors caused by strain or chemical layering within and around individual inclusions. The appearance of interference colors in an inclusion indicates a solid inclusion rather than a cavity or negative crystal.



Inclusions under Crossed Polars

An immersion cell set between 2 polarizing lenses (polarized immersion) can also be used for examining a gem under magnification. Placing a gem in water under crossed polars combines the advantages of a darkfield with that of an immersion cell. Immersion reduces glare and helps make facets disappear as we peer into a gem under a microscope or watchmaker's loupe.

Make Your Own Polariscope

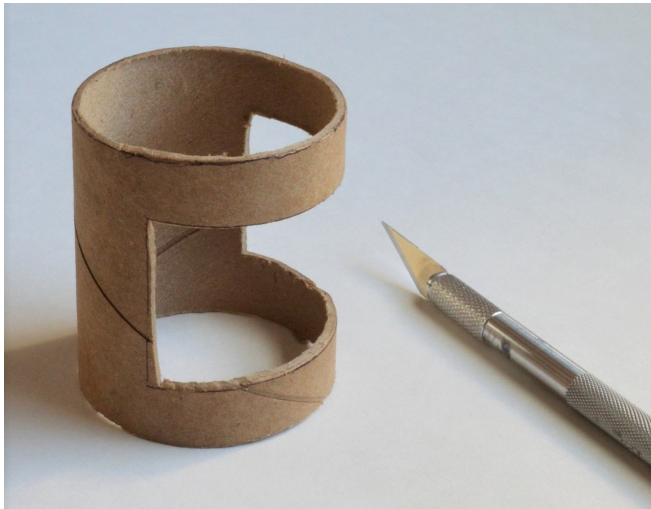
Desktop polariscopes that are commercially available can cost anywhere from \$85 to \$425, but you can easily make your own desktop polariscope for about \$32. Home-made polariscopes offer greater versatility than commercial polariscopes since they can be made in different sizes to accommodate different uses: testing for SR/DR and optic character, polarized microscopy, and polarized immersion. By changing out the middle section that joins the two lenses, we end up with three different polariscopes.

The optional additions of a conoscope and a watchmaker's loupe cost approximately \$26 more. To make your own polariscope, you'll need the following components:

1. An LED battery-run puck light (homedepot.com \$10)
2. A 2" diameter (51mm) mailing tube (amazon.com \$8)
3. Two 55mm diameter polarizing filter lenses (amazon.com \$14)
4. Optional watchmaker's loupe 2 1/2 X power, 4" focal distance (part of a set of 5, eBay.com \$13)
5. Optional conoscope (amazon.com \$13)



Polariscope Components



Mailing Tube Cross-section

Use a razor blade or X-Acto knife to cut a 2 ½" cross-section of tubing. Then cut a large square opening (approximately 2" x 2") in the middle of the cut section of tubing. Spray paint the cut section black.

The 55mm diameter polarizing lenses fit perfectly on the top and bottom of the 2" diameter tubing, and can easily be rotated to crossed polars. The 55mm lenses are an odd size, while 58mm lenses are standard and more commonly available. A pair of 58mm lenses can also be used for your home-made polariscope, but these lenses are too large to fit snugly onto a 2" tube.



Desktop Polariscope

For polarized microscopy, you'll need a shorter polariscope that can fit under the oculars of a gem microscope as the polariscope rests on the microscope stage. Just use a shorter 1" long cross-section of tubing rather than 2 ½" section. Cut away about a third of that section so that an unobstructed opening is left on one side for inserting and rotating the gem. As a light source for the short polariscope, use the light that's built into the microscope stage, or use a bright LED puck light.



Lenses joined by Mailing Tube

Place a small circle of white paper, plastic or cloth over a puck light to diffuse the light, and place the section of the tubing with the two lenses on top of the puck light. Rest the 2 ½ X power (4" focal distance) magnifier on top of the polariscope. Your home-made polariscope is now complete!



Short Polariscope for Microscope

To make a polarized immersion cell, just use a glass tea light holder instead of a section of tubing. A 1 1/8" high by 1 3/4" diameter clear glass tea light holder works well as a vessel for water. A plastic vessel is not suitable because stress lines in the molded plastic produce interference colors throughout the vessel.

Place a gemstone inside the glass vessel filled with water, and then set one polarizing lens over the glass and the other lens under the glass. You can then view the immersed gem under a microscope. If you prefer to view the gem under lower magnification, just set a 4X power (2 1/2" focal distance) watchmaker's loupe on top of the analyzer lens, and place a puck light at the base.



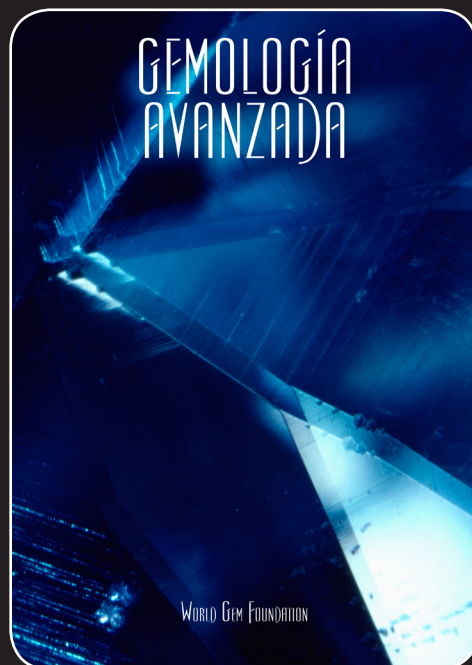
Glass Vessel



Polarized Immersion Cell

All photographs are by Kirk Feral and may not be used without his written consent.

Hablas Español?



Dos cursos ahora
disponibles en español

The Spice of Life

Coloured Gemstones



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.



Sunstone - All that Glitters!



Oregon Sunstones (Photo by Tino Hammid)

Sunstone is actually the common name for gemstones belonging to the feldspar group that exhibit a fantastic optical effect called 'aventurescence'. So any transparent to translucent feldspar that display the 'glittering' effect caused by the interaction of light with the tiny inclusions (in this case consisting of copper platelets) is called 'Aventurine' Feldspar. Sunstone is also known by the name 'heliolite' from the Greek 'helios' for sun and 'lithos' for stone. In other words, the name 'sunstone' refers more to the gem's appearance rather than to its chemical makeup.

Feldspar consists of a group of aluminium silicate minerals that are grouped into either alkali feldspars (albite, orthoclase, sanidine, microcline, and anorthoclase) also known as 'potassium' or 'K' feldspars, barium feldspars (celsian and hyalophane), and plagioclase feldspars (albite, oligoclase, andesine, labradorite, bytownite and anorthite). Due to isomorphous replacement, a property that is also seen in the garnet group, there exists a seamless series of compositions between end-members (extreme compositions) as one element replaces another. In the case of the end

member albite, depending on the calcium or potassium content, it will be classed as either alkali or plagioclase feldspar.

Sunstone is classified as an 'oligoclase' variety of plagioclase feldspar with a chemical composition of $(\text{Na,Ca})(\text{Al,Si})\text{AlSi}_2\text{O}_8$ consisting of between 70 to 100% albite / 10 to 30% anorthite. The most transparent pieces are used to produce faceted stones but the cabochon stones are more famous for their inclusions.

Geology:

Oligoclase crystals are often twinned and usually occur as short and stubby, prismatic, thin tabular, and occasionally elongated. They can also occur as grainy, massive, columnar, and as rounded water worn stones. Sunstone crystals are formed in slow cooling basaltic lava flows, much like Peridot.

Inclusions:

Sunstones contain extremely fine platelets of hematite or goethite that in transmitted light appear red or orange and this creates the unique 'aventurescence' effect. Sunstones from Oregon in the US, also known as Oregon sunstones are very rare and unique due to their added sheen caused by the copper inclusions. This effect is commonly referred to as 'schiller'.

History and Deposits:

Sunstone has been known for over 200 years with some of the earliest finds dating back to the early 1800's in both Russia (Lake Baikal) and southern Norway. Today, sunstones can be found in India, Canada, Norway, Sweden, China, Sri Lanka, Brazil, Kenya and Russia. However the finest sunstones come from Oregon in the U.S. Native Americans originally discovered these beautiful stones, collected them and traded them around the world.

In the early 1900's, American lapidaries 'discovered' sunstone. At that time Tiffany & Company acquired mining claims and even opened the first commercial sunstone



Oregon Sunstone Dreamscape™ 9.48 carats cut by John Dyer (Photo by Lydia Dyer)



Oregon Sunstone Dreamscape™ 16.17 carats cut by John Dyer (Photo by Lydia Dyer)

mine, which produced jewellery with faceted sunstones and cabochons. They called the clear stones 'Plush' diamonds. Later Tiffany & Company sold their claims, probably due to the high costs involved in their extraction.

In the early 1980s, new sunstone deposits were discovered in Oregon that made sustainable commercial mining possible. In 1987 the Oregon legislature named 'Oregon Sunstone' the official state gemstone and this legitimised the lapidary community within the United States

From this moment 'Oregon Sunstone' jewellery designers and lapidaries were inspired to work with sunstone and promote it to Oregon residents and tourists. Today 'Oregon Sunstone' is quite popular and many people who visit Oregon bring it home as a souvenir.

Colour

A wide variation of colours can exist within one stone, ranging from colourless to yellow, orange or red with the latter sometimes resembling red spinel or even ruby. Some exceptional stones are deep green or blue in colour. Certain sunstones can exhibit a colour gradient. They might be pink on one side of the stone with the colour gradually strengthening to orange on the other side. Other stones have sharp colour demarcations. Some exceptional stones are pleochroic – with their colour dependent upon the viewing direction.

Although the common colour of Oregon sunstone is straw yellow, it also can be pink, peach, red, salmon red-orange, red-green, and blue-green. It also can be bi-colored and tri-colored in combinations of yellow, red, and green, with a small percentage being dichroic or trichroic. Yellow gem-quality plagioclase without obvious aventurescence from Mexico has been sold under the name 'Golden Sunstone'.

Physical & Optical Properties:

Physical & Optical Property	Oligoclase Feldspar
Refractive Index	1.537 – 1.559
Birefringence	.009
Dispersion	Weak
Optic Character	Biaxial
Optic Sign	Negative
Specific Gravity	2.64 – 2.66
Hardness	6 – 6 ½
Cleavage	Perfect
Fracture	Conchoidal
Lustre	Vitreous
Colour Streak	White

Sunstone can sometimes display asterism in the form of four-rayed stars, and these stones are known as 'Star Sunstone'. Chatoyancy (Cat's eye effect) has also been noted in sunstone.

Value

The value of gem-quality sunstone is determined by its colour, transparency, and the quality of the aventurescence. Colourless and yellow stones are usually the least expensive with bright red stones, green stones, and nice bi-colour stones having the highest values. Transparent stones exhibiting nice aventurescence will command premium prices.

According to GemGuide, while the price for red, orange and green 'extra fine' stones in the 1.00 to 1.99 carat range are the same, in stones that fall into the 2.00 to 4.99 carat range, an 'extra fine' green will sell for 87% more than a comparable quality orange stone and 40% more than a comparable quality red stone.

Treatments, Synthetics and Care:

Sunstone is not treated or altered to improve its appearance and so far it is not produced synthetically. Goldstone is a man-made stone made from glass that exhibits a 'golden' sheen but it is quite obvious it is an imitation stone.

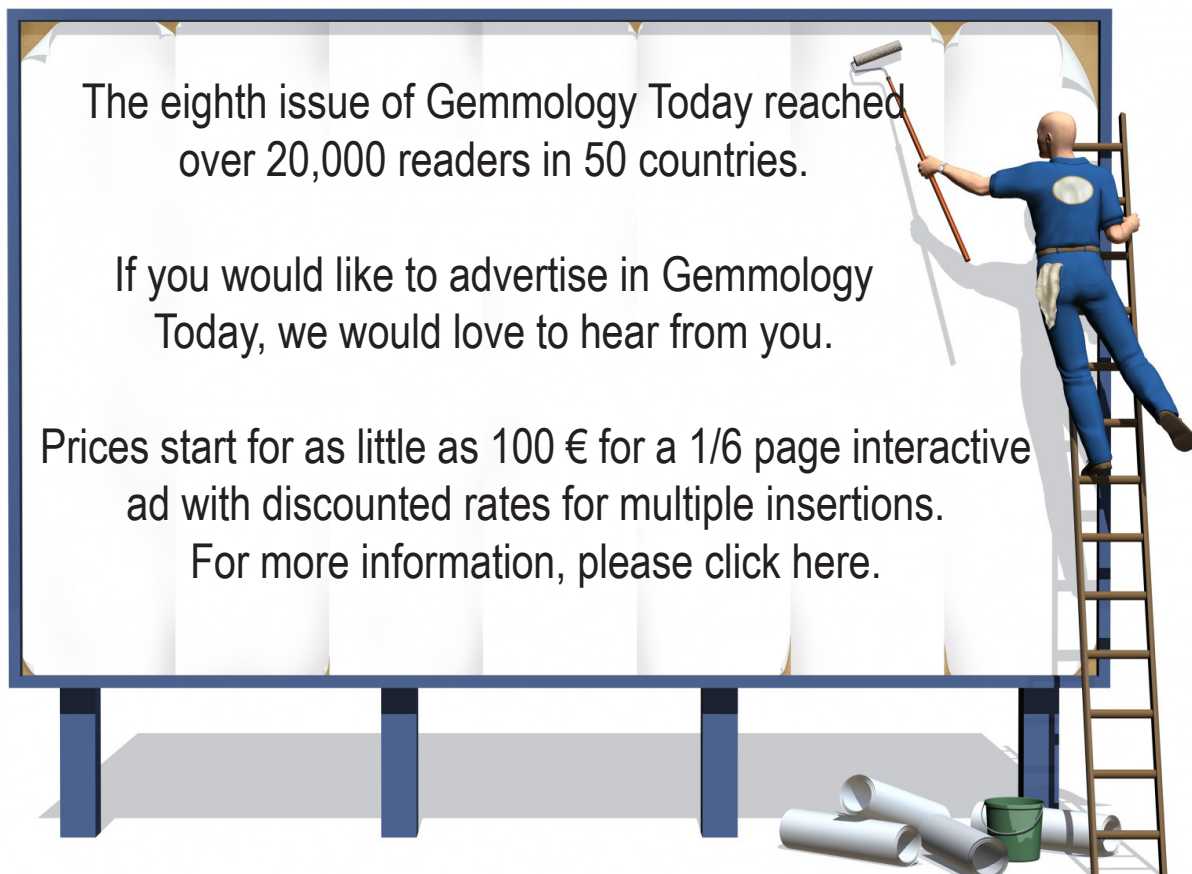
Sunstones are attacked by hydrofluoric acid or other solvents and may crack or cleave under heat.

Conclusions:

Normally the particles of foreign material in a gemstone cause a reduction of clarity in the stone and reduce the price per carat but with sunstone, it is the opposite. The inclusions enhance the desirability of the gem and it is their interaction with light that delights the observer's eyes and has inspired lapidaries and innovative jewellery designs to explore this beautiful gemstone.

References:

Handbook of Gemmology
World Gem Foundation - Coloured Gemstones Course
Mineralsnet.com
Gems, Michael O'Donoghue
Geology.com



Article Submissions

The deadline for the next issue is

February 15th, 2019

Guidelines:

- We do not accept highly scientific articles.
These are better suited for either the Journal of Gemmology or Gems & Gemology
- All articles should be a minimum of one page.
- All accompanying photographs must be high resolution and must be accompanied by written permission to use the images unless the author owns the rights. Wherever possible please try to supply images from the same photographic source or are at the very least compatible with each other. This will ensure that the article is aesthetically pleasing as well as informative.
- We reserve the right to refuse articles

E-mail all submissions to
information@worldgemfoundation.com

Carbon Copy

The World of Diamonds

JAN ASPLUND is the joint CEO of the Scandinavian Gem Academy. He received his FGA (Diploma in Gemmology) and 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).



Early Russian Diamonds

Russia has a long history when it comes to diamonds and several of the world's most spectacular and historical diamonds are in the possession of the Russian Diamond Fund. Peter the Great (1682-1725) created the 'Diamond Fund' in 1719 as part of the Russian Imperial Treasury to which he donated much of the royal jewellery. Peter the Great proclaimed that future rulers also had to donate portions of their jewellery to the Treasury. With the prosperous regime of Catherine the Great (1762-1796) the Russian Imperial Treasury grew significantly and Catherine's great love of diamonds is shown not only by their use in jewellery but also as buttons on clothes and as shoe buckles (Garanin & Kriulina 2017 p. 94). The largest known diamond at the time, the 189.60 carat 'Orlov' (sometimes spelled 'Orloff'), bought by Grigory Orlov in Amsterdam in 1774 was gifted to Catherine by Grigory in a vain attempt to rekindle their romance. Some suggest that the Orlov is in actual fact the 'The Great Mogul', a diamond of Indian origin described by Tavernier and stolen by the Persians in 1739 (Bruton 1978 p. 453). Catherine the Great had the Orlov mounted in the Imperial sceptre where it is still today.



Orlov Diamond in the Imperial Sceptre
(Bron: DIAMONDS - Famous, Notable and Unique GIA)

Another famous historical diamond in the Diamond Fund's collection is the 88.70 carat 'Shah' that was presented to the Russian emperor Nicholas I by the Persian government in 1829 as retribution for the assassination of the Russian Ambassador, Alexander Griboyedoff, in Teheran (The Shah Diamond 2018).



Catherine the Great (Catherine the Great -
Portrait of a Woman by Massie Robert)

Russia held one of the greatest collections of diamonds in the 18th century and it is fitting that Russia became the fourth country in the world where diamonds were found. Prior to their discovery in Russia, diamonds were only known to come from India, Indonesia (Borneo) and Brazil. The young serf Pavel Popov found the first diamond in the Ural Mountains in 1829 (Norman 2010 p. 151). The diamond weighed 0.52 carat and Popov was rewarded with his freedom for his find. The similarities between the alluvial deposits in the Urals and the diamond-bearing deposits in Brazil led to predictions of large deposits of diamonds in Russia (Garanin & Kriulina 2017 p. 95).

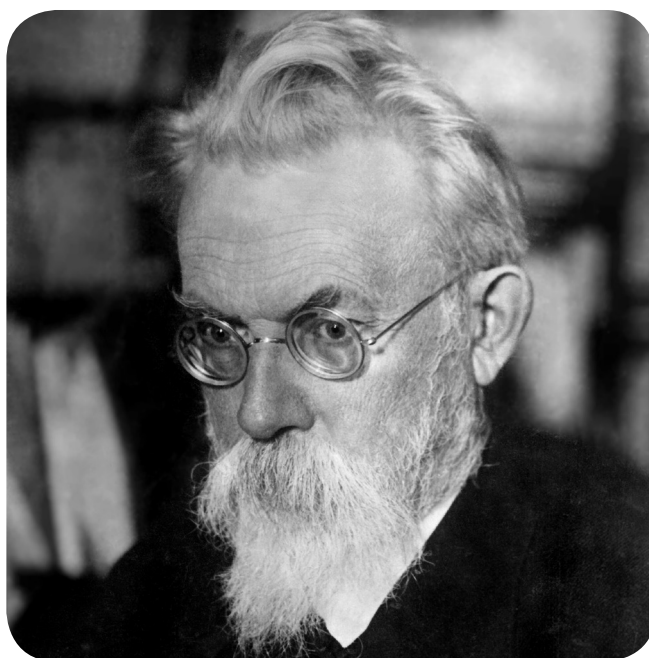
Prior to Popov's discovery, there are a few reports regarding possible diamond finds in Russia. In 1730, a twelve year old boy supposedly found a diamond on the bank of the Dvina river near Orletsy not far from Archangelsk where diamonds are mined today, a deposit that was discovered in 1975. The supposed diamond was cut and sent to the Tsar and the famous and well-respected naturalist Mikhail Lomonosov wrote in his groundbreaking 'About Earths Layers' in 1763

that the Orletsy mountains are able to bear diamonds (Shchukin et al 2017).

Another report on Russian diamonds dates to the 1730's but from a completely different area. The British paper 'The Daily Mercury' described on the 20th of March 1734 that a diamond was found 'in the southern part of Russia, towards Persia and the Mogul's Country' (Ogden 2018 p. 330).

While both reports on diamond discoveries in the 1730's are from areas where diamonds are currently found today (Kazakhstan was finally annexed by the Russian Empire in the late 18th century having previously being part of the Mongol Empire), since the finds were not confirmed by further findings or through documentation it is possible that the supposed diamonds were in fact transparent materials such as topaz or colourless corundum. However, even if the early reports of diamonds in Russia someday turn out to be true it will still make Russia the fourth country where diamonds were found as the discoveries in Brazil were made a few years earlier.

Serious prospecting for diamonds began with the discovery of the young Popov in 1829 with the news of diamonds in the Urals attracting several of the most famous and brilliant geologists and mineralogists at the time. The first diamond discovery however did not come as a surprise to the German naturalist Alexander von Humbolt. Von Humbolt, a few months before the initial find, had suggested that the coarse pebbles that had concentrated after the gold-bearing sand had been washed should be reworked. The Estonian mineralogist Von Engelhardt also predicted that the deposits would be diamondiferous and probably very rich. Von Engelhardt made his prediction on the similarities with the diamondiferous alluvial deposits in Brazil.



Vladimir Vernadsky (Photo Courtesy of AH CCCP - Архив АН СССР, Public Domain)

Altogether four diamonds were recovered in 1829 and in 1830 a total of twenty-six diamonds were found at the same deposit. But to the disappointment of everyone hoping for large deposits, very few diamonds were found during the subsequent years and 50 years later a total of only one hundred diamonds had been found at the Krestvozdvizhenskaya deposit in the Urals with no stone larger than 2 carats (Garanin & Kriulina 2017 p. 95).

It is Siberia that holds the largest deposits of diamonds in the world but it was not until the mid 20th century that any significant diamond deposits were discovered there, the first in 1897 by the Mel'nichnaya River. However since its size (3.2 carats) was considered small, the government was unwilling to fund any further exploration in the area. It was not until after World War II that other diamonds were found in Siberia (Garanin & Kriulina 2017 p. 96).

The government's unwillingness to fund further exploration in Siberia did not stop geologists from setting out theories on potential deposits. In 1908 the mineralogist and geochemist Vladimir Vernadsky published a monograph on the indicator minerals he believed would be found in diamond bearing rocks. Although only one solitary diamond had been found in Siberia at the time of Vernadsky's publication, he still correctly listed the indicator minerals such as olivine, pyrope garnet, chrome diopside and was convinced that Siberia would very likely have significant diamond deposits. How Vernadsky could draw his conclusions when only one single diamond had been found is indeed a mystery (Garanin & Kriulina 2017 p 96).

An explanation to Vernadsky's seemingly brave conclusion is that in South Africa, diggers had already, before kimberlite had been properly described, used pyrope garnets as an indicator as to where diamonds might be found. Pyrope garnets and chrome diopside are two important indicator minerals for diamonds and they share a similar specific gravity as diamonds and other minerals used as indicators when prospecting for diamonds (Norman 2010 p. 151)

During the 1930's several Russian geologists pointed at the similarities with the geology in South Africa and Siberia. Fedorovsky wrote in 1936 that diamonds must be sought in areas with heavy magnesian magmas rich in olivine. In 1937 Vladimir Sobolev discovered a unique basic rock with similarities to the ultrabasic rocks typically accompanying diamond-bearing kimberlites in South Africa (Garanin & Kriulina 2017 p 96). Sobolev had understood the linkage between stable shield areas undisturbed for up to three billion years and diamond-bearing kimberlites almost 30 years before Tom Clifford proposed that diamond-bearing kimberlites could only occur on stable cratons (Norman 2010 p. 153-154).

After World War II, diamond exploration in Siberia resumed. In 1949, twenty-two diamonds were found in gravels at the Sokolinaya Sandbar near the village of Krestyakh and in the coming years, a search for primary deposits of diamonds was focused in the area. The geologists Larisa Popugaeva and Natalya Sarsadskikh were pioneers in using indicator minerals for diamond prospecting. After systematically sampling the Daldyn River looking for indicator minerals they found the first primary diamond deposit in Russia on August 21, 1954. A year later the deposits at Mir and Udashnaya were discovered and in 1960, the province of Yakutsk became the fifth largest diamond producer in the world. The modern era of Russian diamonds had begun.

References:

Bruton, Eric (1978) Diamonds.

Garanin, Viktor, Kriulina, Galina (2017) Diamonds in Russia. Mineral Monograph No 19: Diamonds the Ultimate Gemstone. Arvada.

Norman, Nick (2010) The Extraordinary Word of Diamonds.

Ogden, Jack (2018) Diamonds, an early History of the King of Gems.

Rough-polished (2013)

<https://www.rough-polished.com/en/news/84043.html>

https://ac-els-cdn-com.ezproxy.its.uu.se/S1367912012004622/1-s2.0-S1367912012004622-main.pdf?_tid=3d9c5f90-b322-4ff1-9c89-f2ae95361752&acdnt=1540237682_fb4b3d21a19b72502bc838dcc1d21252 (Requires Password to Access).

Shchukin V.S, Nesis V.N, Trushin S.I, Roslyakov S.L, Efimov K.V, Osetskiy A.I, Shchukina E.V. DIAMOND - BEARING IN THE NORTH OF EUROPEAN RUSSIA AND PROSPECTS OF NEW DIAMOND DEPOSITS DISCOVERY. 11th International Kimberlite Conference Extended Abstract No. 11IKC-4600, 2017. http://11ikc.com/long_abstract/11IKC%20Long%20Abstracts/11IKC_4600.pdf

The Shah Diamond (2018) <http://www.antiques-art-collectibles.com/jewelry/diamond/shah.html>



Mir Diamond Mine - The Republic of Sakha (Yakutia) (Photo Courtesy of WikiMedia Commons CC BY-SA 3.0)

PLEASE NOTE: This image is a panorama consisting of multiple frames that were merged or stitched in software. As a result, this image necessarily underwent some form of digital manipulation. These manipulations may include blending, blurring, cloning, and color and perspective adjustments. As a result of these adjustments, the image content may be slightly different than reality at the points where multiple images were combined. This manipulation is often required due to lens, perspective, and parallax distortions.



Copper - A Penny for your Thoughts

Soft, malleable, ductile, possessing excellent thermal and electrical conductivity, copper is one of the few metals that occurs in nature in a useable metallic form.

Used for over 10,000 years, the name copper is derived from 'aes cyprium' (metal of Cyprus) since during Roman times, copper was mined in Cyprus. The name was later corrupted to cuprum (Latin), then copper (Old English) and finally around 1530, to copper.

Copper has a chemical symbol of Cu, an atomic number of 29, an atomic weight of 63.546, a density of 8.96 g/cm³ and a melting point of 1,085 °C. It is found within the Earth's crust in a proportion of about 50 parts per million (ppm).

Our main interaction with copper is often more domestic in nature. Copper piping used in plumbing due to its resistance to corrosion, as electrical wiring, for roofing and up until 1982 as coinage where the percentage of copper/zinc changed from 95% copper and 5% zinc to 97.5% zinc and 2.5% copper. On a more personal note, the human body contains between 1.4 and 2.1mg per kilogram of body weight.

Copper is also used in the alloying of gold (rose gold) and sterling silver, is used to make brass (copper and zinc) and bronze (copper and tin).

In the 2000's, the price of copper quadrupled due to the increased demand from China. With a typical eight-storey building using around 20 tons of copper wire and piping and with thousands of them being built in the construction frenzy in China, around 50 lbs of copper being used in a typical new car, ½ oz in cellphones and 1.5lbs in a PC, it is not hard to see why. Interestingly, the City of Port Coquitlam in Vancouver recently fired seven employees who were involved in a 'highly co-ordinated' copper theft scheme that lasted over a decade and cost taxpayers in excess of \$75,000. Hard to imagine but the reality is, where there is illegal money to be made, there will always be people willing to take the risks. Here in Spain, a gang of ten Italians and one Spaniard were arrested for stealing over 700,000 litres of virgin olive oil and selling it in Italy. I know, you are

probably laughing but the market value of the oil was over two million dollars!

So what does all this have to do with gemmology? Well just like chromium, copper plays a very important role in the colouration of certain gemstones from turquoise and malachite to Paraíba and Cuprian tourmaline.

While the name Heitor Dimas Barbosa may not be familiar to some, his discovery of Paraíba tourmaline in 1989 at the Mina da Bathalha mine, 4.5 km north-east of the town of Salgadinho, in the Brazilian State of Paraíba single-handedly catapulted tourmaline into the upper echelons of the gem kingdom.

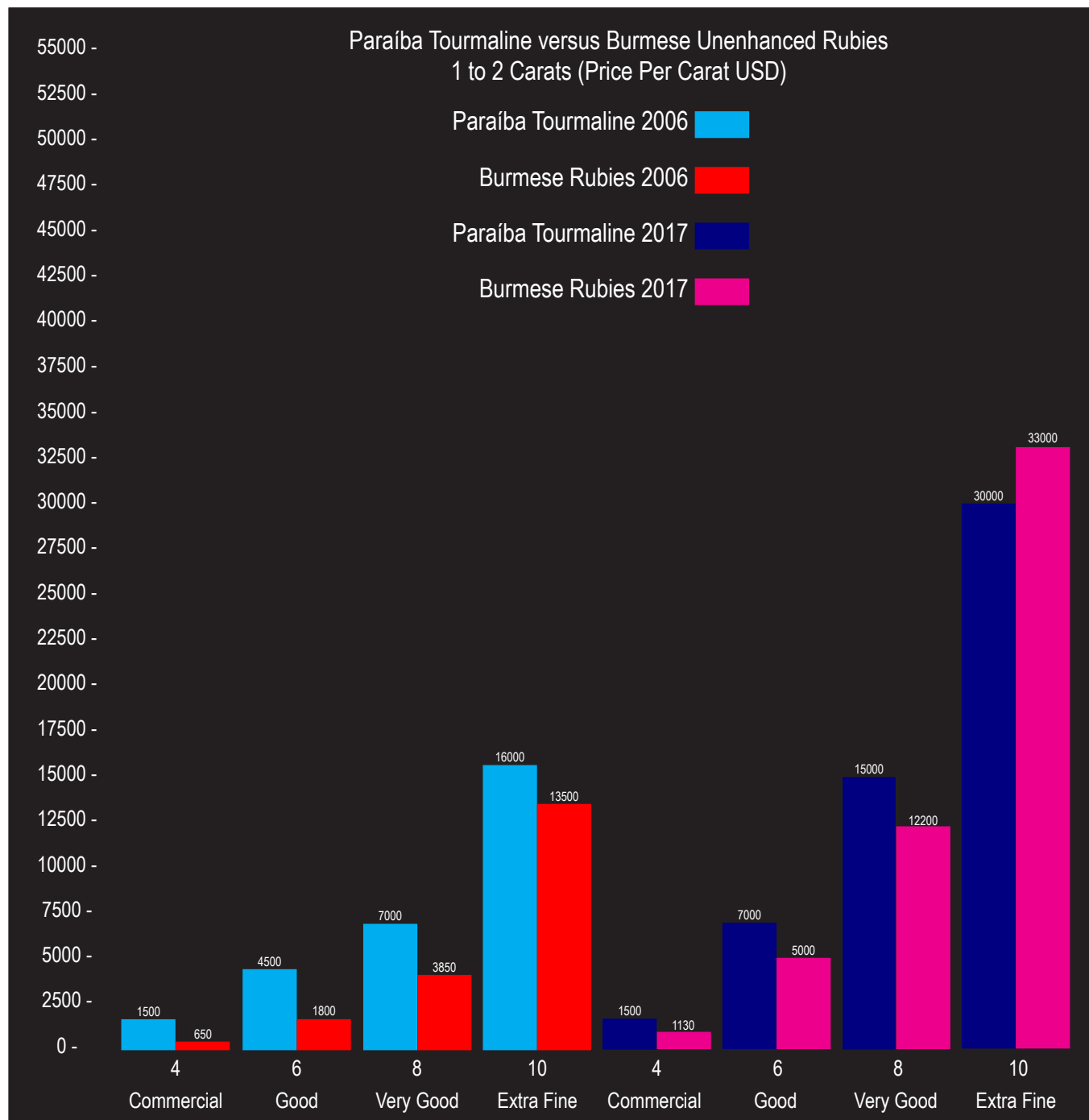
Commanding prices far in excess of fine quality untreated blue sapphires and on par or exceeding, the finest unenhanced rubies from Myanmar, this extraordinary copper-bearing tourmaline is now one of the most highly sort after gemstones in the market today.

As we can see from the pricing graphs on the following pages, the prices that Paraíba tourmaline command are quite remarkable considering the fact that the majority of consumers are still unfamiliar with the tourmaline family of gemstones. In the one to two carat weight categories (CHART A), Paraíba tourmaline out performed Burmese unenhanced rubies in all four quality classifications in 2006 and achieved similar results in 2017 except in the 'Extra Fine' category.

The same is true of stones in the two to three carat weight range (CHART B) although Burmese unenhanced rubies did perform better in the 'Good' (2017) and 'Extra Fine' quality classifications (2006 & 2017).

What Does This All Mean?

Well on the one hand, if you are sitting on a fine quality Paraíba tourmaline, you are sitting on a potential gold mine. Currently a two-carat 'Extra Fine' Paraíba tourmaline sells for 29% more than a two-carat 'D Internally Flawless' diamond with an excellent cut. When I entered the gem trade



Reference: GemGuide Fall/Winter 2006 - 2007 & GemGuide January/February 2017

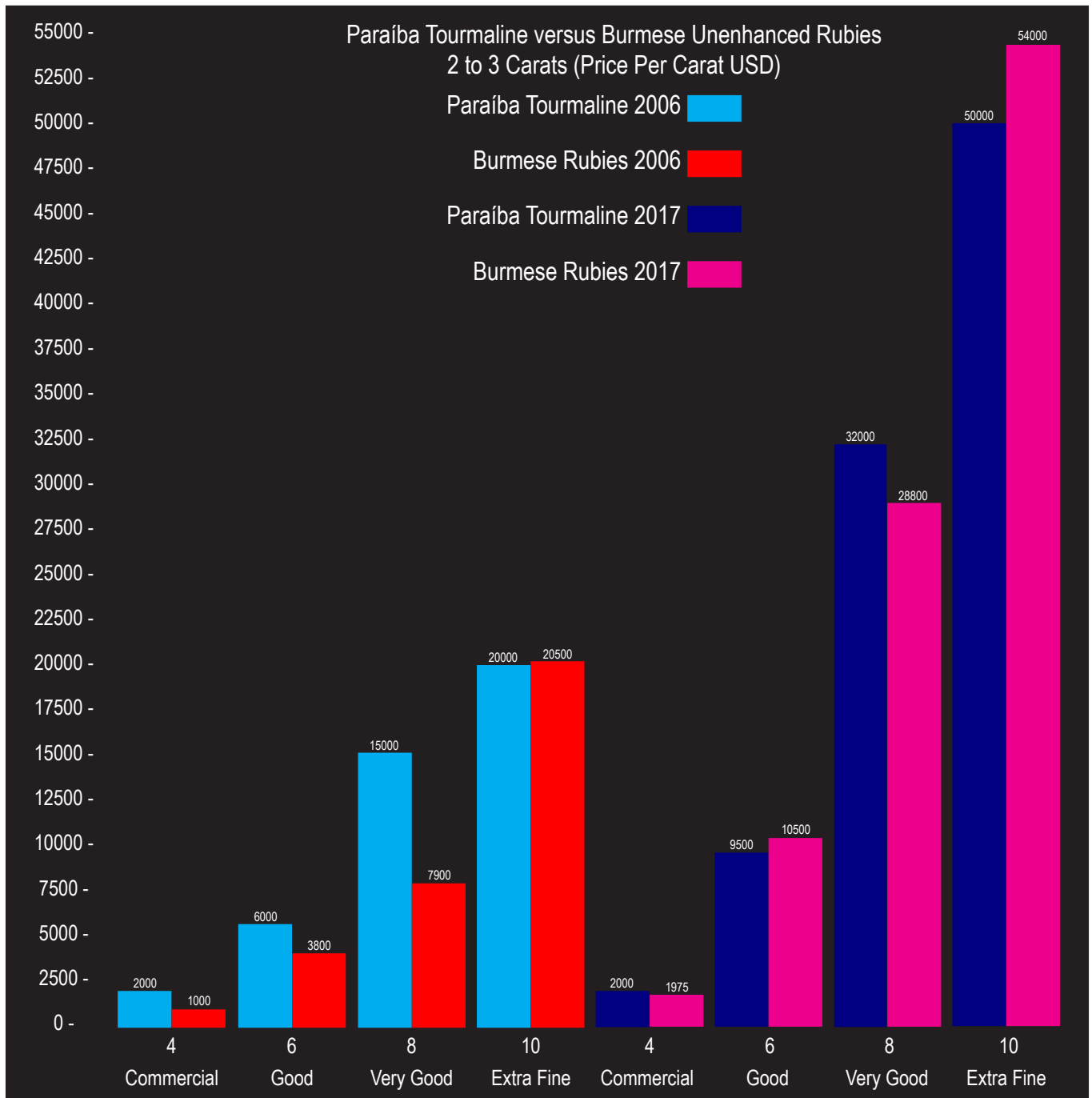
CHART A

in 1980, I would never have imagined this to be possible. How could a tourmaline be worth more than a diamond of similar carat weight? This is one of the remarkable gemstone stories of the century and testament to the economic theory of supply and demand. It is even more fascinating to see this success story from a marketing standpoint. There are indeed rarer gemstones but one only has to hold an 'Extra Fine' quality Paraíba tourmaline to appreciate the fact that one of the driving forces behind this success is the 'beauty' of the gemstone.

On the other hand, whenever you get pricing anomalies in an industry, it often leads to greed and this is certainly the case

with Paraíba tourmaline. Now don't get me wrong, there is nothing wrong with making money but given the astronomical prices that Paraíba tourmalines now command, it has resulted in two very negative developments; unscrupulous dealers pushing for the 'Paraíba' designation on laboratory reports and using the term 'Paraíba-Like' to describe any material that remotely resembles Paraíba tourmaline including 'Neon' apatite and more worrying the treatment of tourmaline.

Research carried out by the Gem Testing Laboratory of the Gem and Jewelry Institute of Thailand (GIT-GTL) on copper bearing tourmalines showed that if the test stones



Reference: GemGuide Fall/Winter 2006 - 2007 & GemGuide January/February 2017

CHART B

were heated using an electric furnace in both a reducing (oxygen-free) and oxidized (oxygen-rich) environment using no additives the stones turned a bright green or greenish blue resembling the typical colour associated with 'Paraíba-type' tourmalines. This involved heating the stones in two hour periods through a series of progressively higher temperatures of 150, 400, 600, and 800 degrees Celsius. While only slight changes were observed below 600 degrees Celsius, the more intense colours were attained in the 600 + degree Celsius range. Since copper is unaffected by heat in this temperature range, the colour change can be attributed to changes in the manganese, titanium, and iron chromophores.

As we all know, the detection of heat treatment is tricky and relies, for the most part, on the use of advanced instrumentation. Given the prices, it would be foolhardy to appraise a tourmaline that resembled a 'Paraíba' without consulting a reliable laboratory.

Un-treated copper bearing Paraíba tourmalines exhibit long growth tubes that are occasionally filled with yellowish-brown secondary minerals and fluid inclusions. When these stones are subjected to heat in an oxidizing (oxygen-rich) environment, these secondary minerals turn a brownish red at 600 degrees Celsius and a more intense brownish-red when heated further to 800 degrees Celsius (Gem and Jewelry Institute of Thailand – Gem Trade Laboratory).



Mozambique Tourmaline Before (Purple) & After (Greenish/Blue) (Heat Treatment) (Photo by Tino Hammid)

Comparison between Indicolite, Chrome, Cuprian, Paraiba and Red Tourmaline

Variety	Commercial	Good	Fine	Extra Fine
Indicolite	Base	Base	Base	Base
Chrome	+ 150%	+ 150%	+ 90%	+ 79%
Cuprian	+ 1983%	+ 2233%	+ 2400%	+ 2437%
Paraiba	+ 3233%	+ 6233%	+ 12700%	+ 14825%
Red	-	-	-	+ 15%

GemGuide January/February 2017

The million dollar question of course is whether or not this occurred naturally or by a gemstone treater.

Paraiba tourmaline is a variety of the Elbaite species of tourmaline, a sodium lithium aluminum boro-silicate with a chemical formula of $\text{Na}(\text{Li},\text{Al})_3\text{Al}_6(\text{BO}_3)_3\text{Si}_6\text{O}_{18}(\text{OH})_4$. Fortunately, it is the chemical complexity of tourmaline that has so far discouraged its synthesis but one can imagine that somebody, somewhere is desperately trying to replicate tourmaline in a laboratory.

Another copper-bearing tourmaline is found in Mozambique and Nigeria and is classified as Cuprian Tourmaline.

The comparative chart above is based on a two-carat stone with indicolite tourmaline as the baseline. As we can see, Cuprian tourmaline also command very high prices and while they may not aspire to the dizzying heights reached by Paraiba tourmaline, they are a far cry from the traditional perception that tourmaline is an affordable gemstone.

While copper is an essential constituent in the chemical composition of both turquoise $\text{CuAl}_6(\text{PO}_4)_4(\text{OH})_8 \cdot 4\text{H}_2\text{O}$ and malachite $\text{Cu}_2\text{CO}_3(\text{OH})_2$, it occurs in Paraiba and Cuprian tourmaline as a transition element and while neither are possible without the presence of copper, it is not an essential constituent of tourmaline. This makes the story of both Paraiba and Cuprian tourmaline all the more fascinating; a chance encounter with a metallic element, the right growing conditions and you create a little bit of magic.

What's not to love about gemmology?



A selection of Paraiba Tourmaline (Photo by Tino Hammid)

Sole Leone

Since 2004

Where Science Meets Art



Passionate about Gemstones & Education

Leone Langeslag (EG)

www.soleleone.nl



The detection of lab-created diamonds, rubies and sapphires is becoming increasingly challenging. In this issue we review the new GemPen® by Gemometrics AB

Ultra Spectrum Optical Filtering Technology (USOF)

I would not say I am a traditional consumer. I appreciate quality but I also accept that the quality and price of an item must bear a direct relationship to its usage. If it is something that I will use for a long period of time, I am happy to pay more for a quality item. I switched over to Mac in 2013 and it was one of the best decisions I have ever made. Yes, I paid more for my Mac than the combined cost of my last five PC's but I could not be happier. At the same token, if I am buying cycling gear, I am loathe to spend € 75 on an Adidas t-shirt when a € 10 Boomerang t-shirt will suffice.

When it comes to gemmology and gem testing equipment however, there can be no compromise. Whether you are a diamond or coloured gemstone dealer, a wholesaler, a jewellery manufacturer, a jeweller or an appraiser, getting it right the first time is critical. Mistakes can be extremely costly and to be quite frank if you are buying and selling diamonds or appraising them and you do not have instruments that are capable of differentiating between natural and lab-created diamonds then you really do need to rethink what you are doing. The simple fact is that lab-created diamonds are turning up in increasing numbers and the likelihood that you will encounter one sooner rather than later is becoming more and more probable as each day passes.

I have to admit that I do not miss the stress of appraising jewellery especially under the ridiculous limitations that are placed on appraisers. Colour grading diamonds while set face-up in a yellow gold bezel setting is quite simply a recipe for failure and while experienced appraisers appreciate that there can be wide differences of opinion when appraising mounted goods, unfortunately jewellers and consumers think otherwise, believing that appraising is an exact science.

From a liability standpoint, if you cannot say with any certainty that a diamond is natural, this has to be stated on the appraisal. Of course if you are unable to make this differentiation, what function does the appraisal really serve? Buyers and insurance companies love gray areas and these types of disclaimers would certainly create lots of gray areas for them to exploit.

When Gemometrics AB contacted me to participate in their GemPen® 'Influencer' campaign, I was excited. I admire inventors and I am particularly drawn to people who invent gemmological instruments because I appreciate that without them, we would not be able to identify gemstones with any degree of accuracy.

First Impressions

While packaging is important, again one has to look at the target market. An item selling in a retail environment needs to have curb appeal, something that will attract the attention of the buyer. When you are selling a gemmological instrument, performance, quality and reliability needs to be of the utmost importance. You do not need to spend exorbitant amounts of money on the packaging.

Gemometrics AB have come up with attractive packaging, a little understated perhaps but functional and appealing.

The true magic happens when you open the black box. As I extracted the GemPen®, I immediately thought of Harry Potter. The black hexagonal tubular design resembles a magic wand, something that Severus Snape would have been proud of and quite possibly used. It is obvious that this is a product that is well thought out and it did not surprise me to find out that Gemometrics AB had hired the services of an industrial designer. Of course the shape was chosen not only to make it appealing to the eye but also to prevent it from rolling off a table and to make it easier to hold.

The quality is evident when you pick it up, with a sturdy construction that is clearly designed to withstand the rigors of fieldwork. There are no on/off buttons, simply a twist mechanism that somewhat resembles a 'Pepper Mill'. The four enclosed filters have magnetized connections so there is nothing to screw on or off making it very easy for the user to interchange the filters, something that is highly encouraged by the developers.



The Portability of GemPen® (Photo Courtesy of Gemometrics AB)

Operation

To switch the GemPen® on, you simply turn the knob one click clockwise (60°). A white light will begin to shine indicating that GemPen® is turned on. To switch GemPen®, off, you simply turn the knob one click counterclockwise.

Since GemPen® uses UV light, one of the main challenges is to ensure that any stone being tested is viewed in a darkened environment so that even the slightest fluorescence or phosphorescence can be observed. The attractive travel case that GemPen® comes with also doubles as a 'Dark Room' that can be used for viewing stones.

As Antoinette Matlins noted in her article on UV light in the September 2018 issue of *Gemmology Today*, users need to understand that a stone should be exposed to UV light for more than a couple of seconds to allow for maximum excitation otherwise you might not only miss the fluorescence but also the intensity, which in the case of GemPen® is critical.

The one drawback that we noted was the automatic shut off. It works perfectly for testing individual stones and is obviously designed to preserve battery power but when testing a large parcel of stones, it does require the device to be turned back on again. The current cut-off is around one minute. Personally, I would like to see the automatic shut-off period extended to perhaps two minutes.

GemPen® comes with four filters, each designed to be used on different gemstones (diamonds, rubies and blue sapphires) or in some cases to be used on the same stone. The filters are attached to the opposite end of the GemPen® and it is important that the correct filter(s) be used.

After the GemPen® is switched on, you simply point it towards the gemstone with the filter within 30-50 mm of the gemstone. Depending on the position of the gemstone you may want to twist and tilt GemPen® for a more accurate result.

GemPen® emits UV Xenon light and utilizes 'Ultra Spectrum Optical Filtering' technology so when it is turned on, it is very important that you avoid any exposure to unprotected eyes or skin. Gemometrics AB recommend the use of UV safety goggles.

So what are we looking for?

We are essentially looking for four things:

- The presence of fluorescence
- The presence of phosphorescence
- The strength of either the fluorescence and/or phosphorescence
- The colour of the fluorescence and/or phosphorescence

As you can see from the 378 natural and lab-created diamonds, natural and lab-created blue sapphires and natural and lab-created rubies from the study collection of the Instituto Gemológico Español (IGE) that Egor Gavrilenko and I tested (opposite page), there were marked differences in their fluorescence/phosphorescence, strength and colour.

Gemometrics AB are careful to avoid the pitfall of advocating GemPen® as the magical black box that will satisfy all your gemmological needs, instead insisting that GemPen® must be used in conjunction with other gem testing instruments. It would be foolhardy for anyone to make a definitive decision based on one test. We have seen this with diamond and moissanite testers and we all know the costly mistakes that many have made due to an over reliance on one instrument. Personally I do not want a 'One Stop – One Shop' instrument. My greatest joy is gem identification. It was what drew me into gemmology and the idea that a button-pushing operator could replace us worries me. There must always be a 'human element' in the identification of gemstones and I am happy that Gemometrics AB feels the same way.

GemPen® comes with a downloadable PDF that includes the operating instructions and a 'Fluorescence' map. The Fluorescence map interprets and displays the various intensities of emitted fluorescence (1 to 5) in different colours (A to L) as follows:

- 5 = chalky light (i.e. chalky white or blue)
- 4 = very strong fluorescence
- 3 = strong fluorescence
- 2 = low fluorescence
- 1 = (very) faint fluorescence
- Inert = no fluorescence can be detected

Personally I would like to see an intermediate grade between 2 (low) and 3 (strong) since I am sure there will be stones that fall between these two grades.

Test Results

Diamonds

While all of the natural and lab-created diamonds fluoresced using the GemPen®, the majority of the natural diamonds (94.5%) exhibited faint to low fluorescence while 100% of the HPHT and CVD diamonds exhibited strong to very strong fluorescence. Interestingly of the 161 colourless natural diamonds tested, only 6% exhibited phosphorescence while 100% of the HPHT diamonds and 86% of the CVD diamonds phosphoresced. Phosphorescence however in lower coloured diamonds (not fancy colours) was higher (39%). This means that of the 243 natural diamonds tested, 17.3% would give a result that would warrant a closer examination while of the 32 lab-created diamonds tested, 9.3% of the stones would need to be tested further.

Blue Sapphires

Only 11.5% of the natural blue sapphires exhibited fluorescence using the GemPen® while 100% of the flame-fusion (Verneuil) lab-created blue sapphires fluoresced. We found that the reactions were stronger under Filter Two compared to Filter Three. None of the stones tested (natural or lab-created) exhibited any phosphorescence.

While unfortunately only three flux-melt 'Chatham' blue sapphires were tested, we did not find the results conclusive.

Rubies

Only 27% of the natural rubies exhibited faint to weak fluorescence using the GemPen®. In the lab-created rubies, 100% of the flame-fusion (Verneuil) lab-created rubies exhibited strong to very strong fluorescence while of the thirteen flux-melt (Knischka & Chatham) lab-created rubies tested, twelve exhibited strong to very strong fluorescence and one (Knischka) exhibited weaker fluorescence that we



Gemometrics Fluorescence Map

Natural & Lab-created (HPHT & CVD) Diamond Results

Gemstone	Filter	Number of Stones Tested	Fluorescence	%	Fluorescence Range	%	Fluorescence Range	%	Phosphorescence	%
Natural Diamonds (Colourless)	1	161	161	100%	Faint to Low	94.5%	Strong to Very Strong	5.5%	10	6%
Natural Diamonds (Yellowish to Brownish)	1	82	82	100%	Faint to Low	100%	Strong to Very Strong	0%	32	39%
HPHT Lab-created Diamonds	1	11	11	100%	Faint to Low	0%	Strong to Very Strong	100%	11	100%
CVD Lab-created Diamonds	1	21	21	100%	Faint to Low	0%	Strong to Very Strong	100%	18	86%

Natural & Lab-created Blue Sapphire Results

Gemstone	Filter	Number of Stones Tested	Fluorescence	%	Fluorescence Range	%	Fluorescence Range	%	Phosphorescence	%
Natural Blue Sapphires	2	26	3	11.5%	Inert	88.5%	Strong (Chalky)	11.5%	0	0%
Natural Blue Sapphires	3	26	3	11.5%	Inert	88.5%	Faint to Low	11.5%	0	0%
Flame-fusion Blue Sapphires	2	17	17	100%	Inert	0%	Medium to Strong	100%	0	0%
Flame-fusion Blue Sapphires	3	17	17	100%	Inert	0%	Medium to Strong	100%	0	0%
Flux-Melt Blue Sapphires	2	3	1	33%	Inert	67%	Low	33%	0	0%
Flux-Melt Blue Sapphires	3	3	1	33%	Inert	67%	Faint	33%	0	0%

Natural & Lab-created Ruby Results

Gemstone	Filter	Number of Stones Tested	Fluorescence	%	Fluorescence Range	%	Fluorescence Range	%	Phosphorescence	%
Natural Rubies	4	26	7	27%	Inert	73%	Faint to Low	27%	0	0%
Flame-fusion Rubies	4	18	18	100%	Inert	0%	Strong to Very Strong	100%	0	0%
Flux-Melt (Knischka) Rubies	4	7	7	100%	Inert	0%	Low to Very Strong	100%	0	0%
Flux-Melt (Chatham) Rubies	4	6	6	100%	Inert	0%	Strong to Very Strong	100%	0	0%

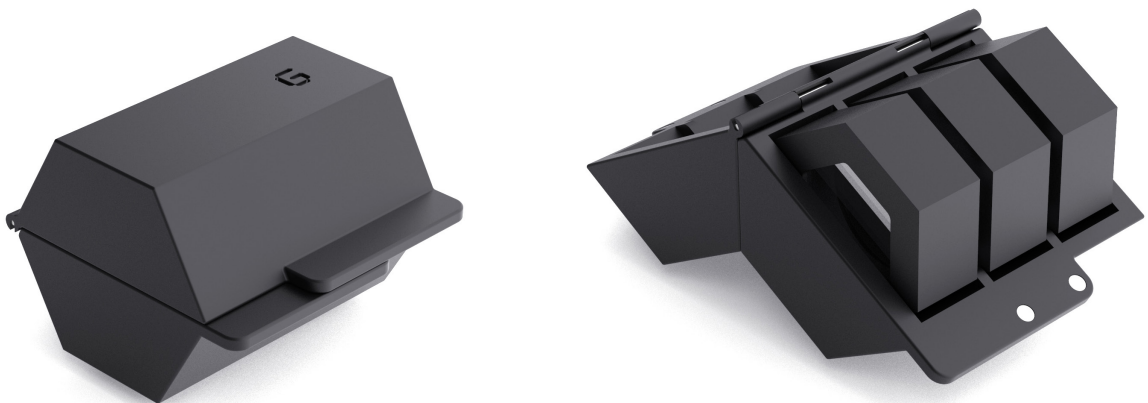
Test results for natural and lab-created diamonds, blue sapphires and rubies from the study collection of the Instituto Gemológico Español (IGE). Tests conducted on Oct 3rd, 2018 by Egor Gavrilenko (Head of the IGE Laboratory) and Geoff Dominy (Founder/CEO World Gem Foundation)



GemPen® in Action (Photo Courtesy of Gemometrics AB)



GemPen® Dark Room and Travel Case (Photo Courtesy of Gemometrics AB)



GemPen® Filter Case and Filters (Photo Courtesy of Gemometrics AB)

felt could potentially be confused with that seen in the natural rubies. None of the stones tested (natural or lab-created) exhibited any phosphorescence.

Conclusions

The simple fact is that in this day and age, you have got to invest in advanced technology to accurately detect lab-created diamonds, sapphires, rubies and treated stones.

While we did not test the accuracy of GemPen® in the detection of treated diamonds, sapphires and rubies, having an instrument capable of screening these stones and highlighting any anomalies is extremely important.

The portability, the quality of the construction and the flexibility of GemPen® makes it a very attractive option. While some may view this simply as a UV light source it certainly is not. The reaction of blue sapphires for example was different using Filters Two and Three with the fluorescence far stronger under Filter Two. This clearly demonstrates that the various filters are designed to zero in on certain wavelengths that will excite different gemstones in different ways.

Some may balk at the price but imagine selling a one-carat CVD or HPHT lab-created diamond mistakenly as a natural diamond and the financial and legal ramifications this could entail. Professionals understand the value of a good reputation and how easily it can be tarnished or lost because of one mistake.

Used carefully and in conjunction with other gem testing instruments, GemPen® is a great screening tool, one that will give the user valuable information that will aid in the correct identification of diamonds, sapphires or rubies.

Review of the GemPen® by Geoff Dominy

GemPen® Functions

Power switch (On/Off)
UV Xenon Light source
Lithium battery (LiPo 18650) embedded in non-conductive material to prevent electrical discharges
GemPen® Aluminum Casing
Filters for diamonds, rubies and sapphires
USB-C port

GemPen® Specifications

Length: 240 mm
Width: 36 mm
Height: 32 mm
Weight: 405 g
Power: 2,5 W / 3300 mAh Battery: 12 Wh

Operational temperature: -10° C to + 50° C

Charging temperature: 0° C to + 45° C

Maximum 95 % humidity non-condensing IP 54

EMC: EN 61000-6-3:2007/A1:2011 EMC: EN 55022:2010 class A/B

GemPen® Case Specifications

Length – 252 mm
Width – 55 mm
Height – 40 mm
Weight without GemPen®: 130 g
Weight with GemPen®: 535 g

GemPen® Filter Casing Specifications

Length – 56 mm
Width – 55 mm
Height – 40 mm
Weight without filters: 35 g
Weight with filters: 85 g

Specification of GemPen®

LED Indicator Colors Off / No light
On / White (constant)
Charging <50% / Orange (blinking)
Charging >50% / Green (blinking)
Fully charged (charger mounted) / Green (constant)
Battery level medium / Orange (constant)
Battery level low / Red (blinking)
Safety timer (after 1 minute) / White (blinking)
Service needed / Red (constant)

Warranty

GemPen® comes with a one year warranty.

Selling Price

€ 4000

If you would like to contact Gemometrics, you can reach them at:

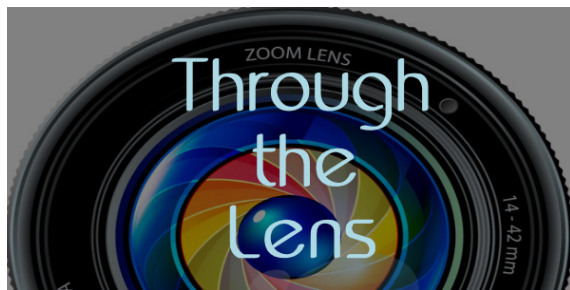
Website: <https://gemometrics.com>

Facebook: <https://www.facebook.com/gemometrics/>

Email: info@gemometrics.com

Address: TIMMERMANSGATAN 22
Shopping Galleria
972 31 Luleå, Sweden

Telephone Number: +46 72 44 99 050



'As I'm constantly in search of improvement for my technique and overall results, I started searching the net for information on photography'. Self-taught gem and jewellery photographer Arjuna Irsutti shows just how far you can go if you have passion, desire and determination.

Meet Arjuna Irsutti



not easy, I was also painfully aware of the fact that no online business could ever succeed without high quality photography.

As I'm constantly in search of improvement for my technique and overall results, I started searching the net for information on photography. The aim was simple and hasn't really left me since then I wanted the best possible result.

This constant quest for excellence led me where I am today and, while there is always room for improvement, I certainly have come a long way since my first shots.

Finally, I must concede that, if my family, friends and customers didn't support and push me during all these years, I may not have thought of making a career out of it.

GT: Natural talent or acquired through study?

AI: A bit of both really, and since one is needed to sublimate the other it's a chance really. I mean talent can only take you so far without hard work and the study of techniques that will help you reach the next level.

I guess my talent stems from the fact that I enjoy looking for the angles, I enjoy playing with the light and finding a balance in symmetry. I am truly obsessed with it but, it would have stayed at that had I not had the drive to improve and learn more!

Luckily for me though, I also happen to be a bit of a geek and, spending hours scouring the internet in search of information about how to improve my shots, my Photoshop or Lightroom proficiency, is part of the fun of my work.

All in all, I'd say that it's more about whether you are passionate or not rather than whether it is innate or not. Passion will drive you to get better and to improve your skills while a natural without passion will only go so far.

GT: Who is Arjuna Irsutti? Tell us about your background?

AI: I was born in a city near the Italian jewellery capital: Vicenza. I was mostly raised in my mother's jewellery shop and, by age 20, I followed my father in the gem trade in Bangkok. I took my first steps in the trade in 2008 and completed my G.G. from I.G.I. Antwerp in 2011.

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

AI: By the late 2012, having a sizable stock of gemstones and not necessarily knowing how to market them, I decided to start advertising the company online.

As I've always liked DIY type labour I decided to try the photography myself. While I soon realized that it was

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

AI: I don't know if I can say that I met my Eleanore quite yet but I can surely say that emerald are the most complex gems to photograph. At least, that's how I've been feeling until now.

That gem has forced me to invest more hours in study and try outs than any other gems and, frankly speaking I'm still not quite satisfied with the result.

It's getting better, but not there yet... More work for me there!

GT: What is the one most memorable gemstone you have photographed and why?

AI: Probably one of my favorite pieces is the 'Aroma of the Earth', a citrine of 278.30 carats cut by Victor Tuzlukov, the symmetry and the design of that cut is surprisingly beautiful.

GT: Is there still a place for analog film in the world of gem photography?

AI: To be honest, I never really knew film photography... I mean I was born in 1988 but by the time I started shooting professionally there was little to no space for film photography. In our job, time is of the essence and unfortunately that also happens to have an impact on the cost of each picture I take. The logical answer for most, if not all modern gem photographers is to shoot on digital rather than film.

It feels like people who shoot on film nowadays are more aficionados rather than pros. It is a lovely support but it's also expensive and time consuming. It's not really an economically viable business anymore.

GT: Are you a purist or do you use software, such as Photoshop, to bring out the best in your photographs?

AI: I think we first need to define what is a purist? To me, it is the person that delivers a picture that is as close to the original product as possible. In today's world, that involves digital editing.

This being said, one needs to remember that, what makes the difference between a good and a bad shot isn't the digital editing more so than the way the light was set up.

I personally spend a lot more time setting up my lights than I do editing for it is the only way to have a shot that is 70 to 75% battle ready after importing it from the camera to the computer.

At that point, you still need to calibrate your camera and edit the picture to make it perfect but don't misunderstand, Photoshop doesn't take the shot, I do.

GT: Guitarists are always asked about the equipment they use and the ones they most prefer. What is your camera of choice and why?

AI: Personally, I use a Nikon 500 with a Nikon 105mm Macro Lens out of habit. I started with Nikon, started to invest in Nikon gear, was happy with it and stuck with it.

This being said, when you are looking at top end gear, and by that I mean Pro and semi-pro gear, they are more or less all the same spec-wise. What really makes a difference is your personal approach to it.

What makes a difference is, more how does it feel in your hand, is it ergonomically optimized for you and can you get used to the menus, rather than knowing whether it's such and such brand.

Once you take all of that into account, remember one thing, the lens is more important than the body of the camera itself. So if you need to compromise, do the right thing, buy the lens!

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

AI: I personally think that gemmology has been improving significantly in recent years and, is likely to continue doing so in the near future.

The reasons behind these improvements are numerous; information travels faster thanks to the Internet, gemmological education is becoming more widespread and, honestly, I believe that the advent of new treatments and deposits also pushes the lab gemmologists to study faster and harder about these happenings.

All these result in an increased number of gemmological publications that improve our knowledge as a group.

The drawback though is that, it also gives more space to shams and other quack doctors that have nothing better to do but to publish nonsensical information over the Internet.

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

AI: Right attitude on business, attention for details, dedication to his work and a lot of hours spent between doing and learning, learning and trying, without giving up and always reaching for the best result.



Unheated Mogok Trapiche Sapphire (8.30 carats) (Courtesy of Jeffery Bergman, Primagem, Bangkok) (Photo by Arjuna Irsutti)



Vayrynenite 18.78 carats (Courtesy of Jeffery Bergman, Primagem, Bangkok) (Photo by Arjuna Isrutti)



Ethiopian Emeralds (Courtesy of Jeffery Bergman, Primagem, Bangkok) (Photo by Arjuna Isrutti))



Mogok Ruby Crystal 231.34 carats (Courtesy of Jeffery Bergman, Primagem, Bangkok) (Photo by Arjuna Isrutti)



Platinum 'DNA Ring' Centre Diamond 1.00 carat E VVS1 (Courtesy of Jeweler Frederic Bonnet (Paris – S.A.E.) (Photo by Arjuna Isrutti)



18Kt Diamond Ring, Centre Diamond 0.80 carats Cushion Modified Brilliant F VS2 (Courtesy of Jeweler Frederic Bonnet (Paris – S.A.E.) (Photo by Arjuna Isrutti)



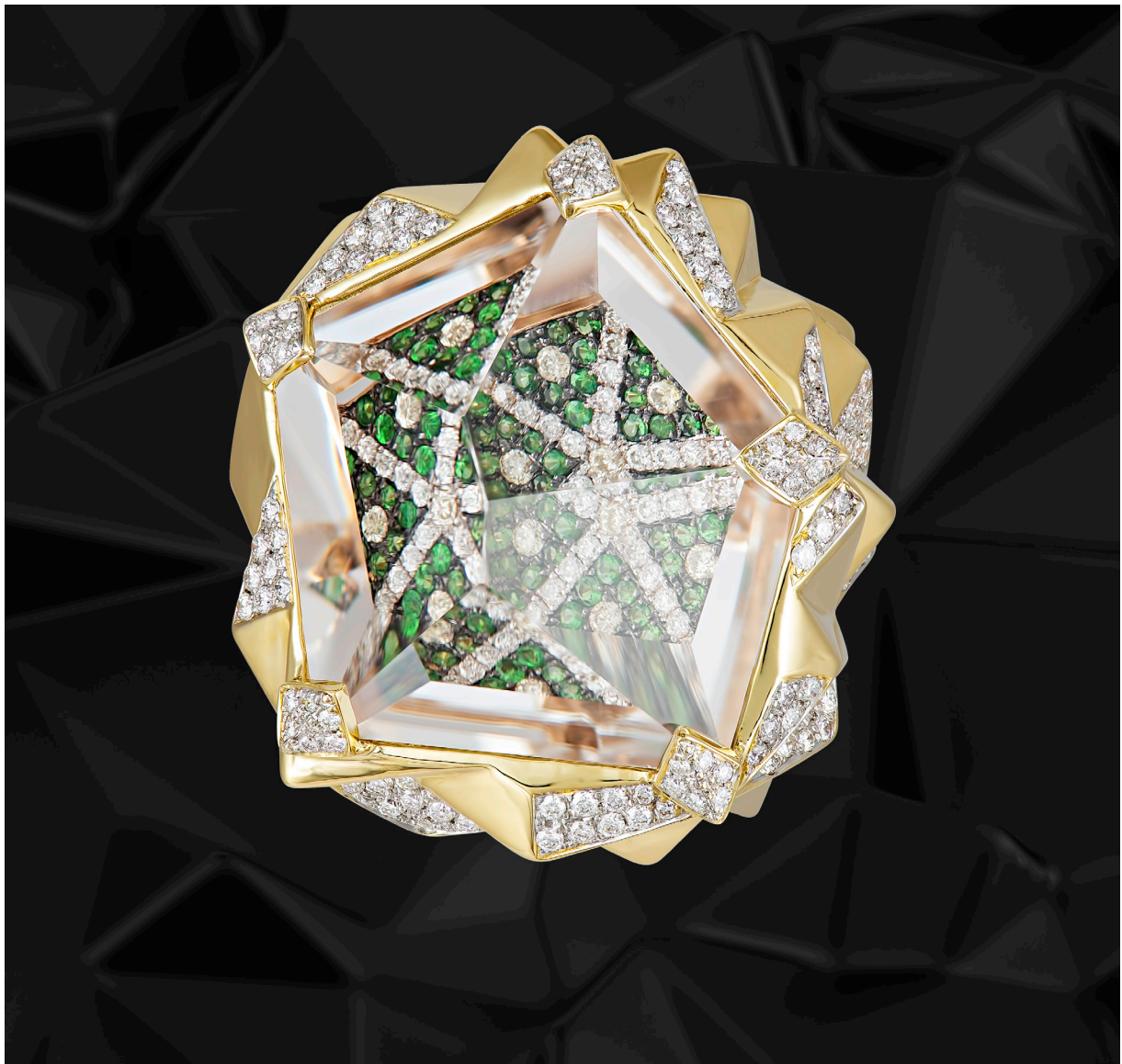
Burmese Ruby (2.79 carats), Emerald, Tourmaline, Diamond & Black Pearl Necklace from the 'Forest' Collection
(Courtesy of José María Goni) (Photo by Arjuna Irsutti)



Rubellite Tourmaline (13.27 carats), Fancy Yellow & Champagne Diamonds, Fancy Sapphires and Tsavorite Garnets.
Necklace from the 'Forest' Collection (Courtesy of José María Goni) (Photo by Arjuna Irsutti)



Royal Indigo Tourmaline (3.48 carats) (Courtesy of Asia Lounges) (Photo by Arjuna Irsutti)



Rock Crystal (Quartz), Tsavorite Garnet and Diamond Ring from the 'Pentágono' Collection
(Courtesy of José María Goni) (Photo by Arjuna Irsutti)



Mahenge Natural Neon Pink Spinel (2.54 carats) (Courtesy of Asia Lounges) (Photo by Arjuna Irsutti)



Sri Lanka Unheated Sapphires (4.25 carats TW) in 18Kt gold and Diamond earrings (Courtesy of Asia Lounges) (Photo by Arjuna Irsutti)



Unheated Madagascar Sapphire (3.41 carats) in 18Kt gold and Diamond ring (Courtesy of Asia Lounges) (Photo by Arjuna Irsutti)



Russian Demantoid Garnet (0.77 carats T.W) and Nigerian Spessartite Garnet (3.94 carats T.W)
18Kt gold and Diamond earrings (Courtesy of Asia Lounges) (Photo by Arjuna Irsutti)



Aquamarine (2.82 carats) in 18Kt gold ring with Diamonds and Sapphires (Courtesy of Asia Lounges) (Photo by Arjuna Irsutti)



Three Congo Tourmaline and Diamond rings, 18Kt white and pink gold (Courtesy of Asia Lounges) (Photo by Arjuna Irsutti)



Mandarin Garnet (3.74 carats) 18Kt gold and Diamond ring (Courtesy of Asia Lounges) (Photo by Arjuna Irsutti)



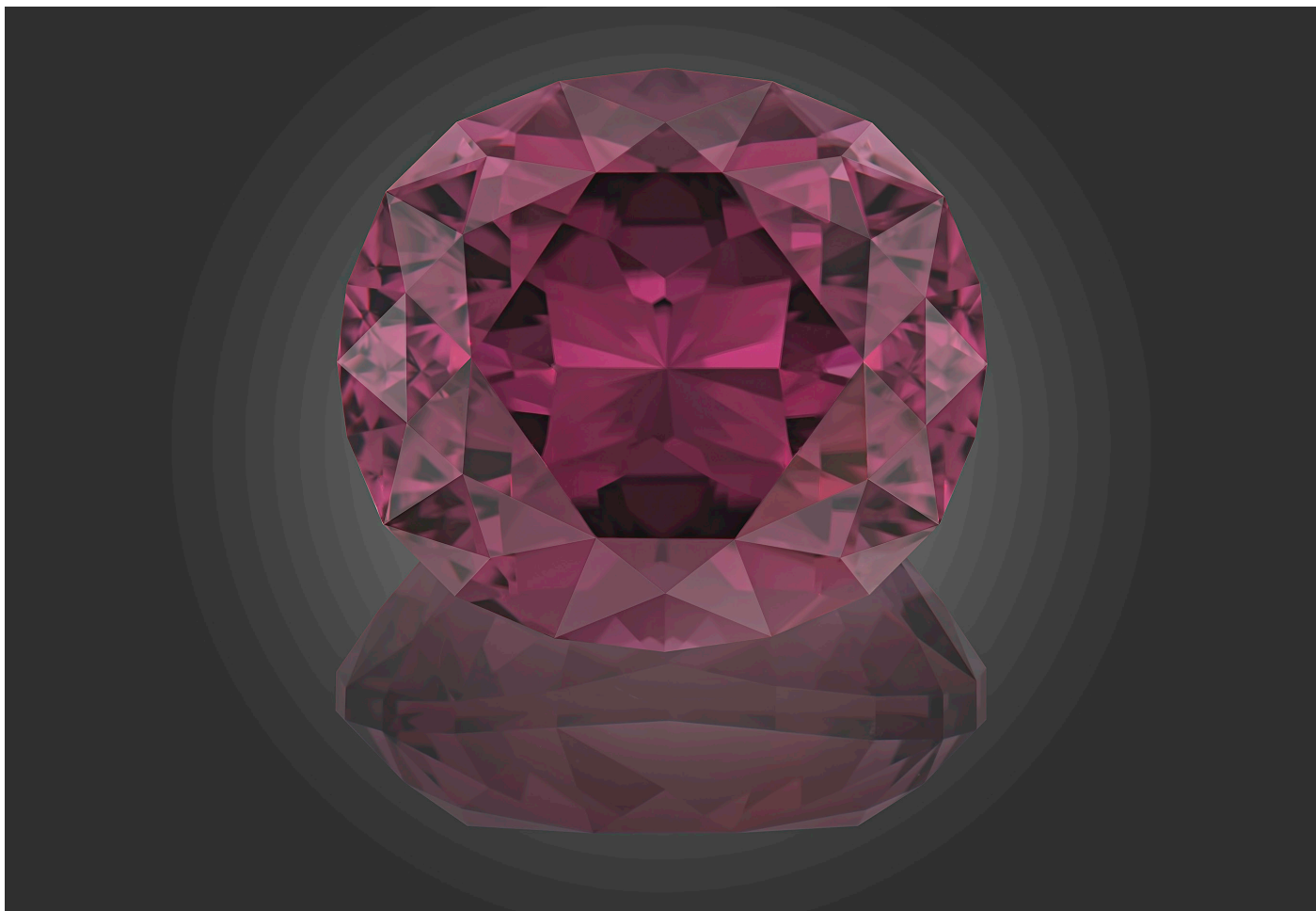
'Echo of the Infinity' Amethyst (159.68 carats) cut by Victor Tuzlukov (Photo by Arjuna Irsutti)



'Aroma of the Earth' Citrine (278.30 carats) cut by Victor Tuzlukov (Photo by Arjuna Irsutti)



'The Winner' Kunzite (200.64 carats) cut for Stonetrust U.S.A. by Victor Tuzlukov (Photo by Arjuna Irsutti)



Nigerian Tourmaline (19.45 carats) cut by Victor Tuzlukov (Photo by Arjuna Irsutti)



One year with EXA: Review of the portable fluorescence spectrometer by MAGI Labs by Peters Brangulis – CEO, Latvian Assay Office & Egor Gavrilenko – Director of Gem Testing Laboratory of the Spanish Gemmological Institute

EXA - More Magic from MAGI

Introduction

The first prototype of the portable UV fluorescence spectrometer EXA was presented by MAGI Labs in May 2017 and has been available since November 2017. In this article we offer an in-depth review of EXA after using it in two different gem-testing laboratories, the Latvian Assay Office and the Spanish Gemmological Institute. One of the authors (PB) was also actively involved in the development of EXA from the earliest stages of the project and was the first gemmologist to use the prototype in his Lab in Latvia.

The working principle of the EXA is similar to the standard gemological UV lamp. When gems are exposed to UV light, many of them emit visible light of different colors and intensities, a phenomenon known as fluorescence that is widely used in gemology. EXA uses a very strong long-wave UV light source (365nm) to cause fluorescence and the light emitted by the gem is sent to a very sensitive spectrometer. Therefore, instead of simply observing the fluorescence by eye, one can analyze in detail the spectral composition of the radiation emitted by a gemstone in the range of 410 to 1000nm. This includes the visible portion and the near IR region that is beyond the capacity of the human eye that can also be very informative. The exact position and relative intensity of the fluorescence peaks and bands are characteristic for many gemstones and can provide valuable information for a number of gemological applications, many of which still need to be investigated.

Gemmologists are aware of the growing numbers of synthetic diamonds that are coming onto the market. Each year, the amount of synthetic diamonds increases by magnitude. We have observed synthetic diamonds for the last five years and for the last two years we have been dealing with the identification of synthetic diamonds (HPHT and CVD) on a daily basis. Large loose stones can be an easy task for a modern well-equipped gem laboratory, but what about mounted melee stones? For synthetic HPHT diamonds, the observance of phosphorescence is widely used but recent reports now show that phosphorescence can be unreliable even for HPHT synthetics, is frequently absent in CVD synthetics and can be present in some rare natural diamonds. The approach used by EXA is to identify

natural diamonds and to offer a simple testing method that gives 100% confidence that the stone is natural. The methods used for the synthesis of diamonds are constantly being improved and modified and nobody can predict what properties may be present in material that has not been developed at this time. Therefore in the long run, any method based on current properties could fail.

The main purpose of EXA is to offer the possibility of a fast and reliable method of identifying colorless to near-colorless natural diamonds from stones that could be either synthetic (HPHT or CVD) or even imitation.



Figure 1. EXA working in 'Basic' mode, with 'PASS' result on the screen corresponding to natural diamond.



Figure 2. 'REFER' reading in 'Basic' mode corresponds to synthetic diamonds, imitations and a very low percentage of natural diamonds. 'REFER' stones will need additional testing to be identified; however, some of them can be positively identified in 'Advanced' mode.

In the 'Basic' mode, EXA offers two options, 'Pass' for natural diamonds (Figure 1) or 'Refer' for synthetics, imitations or a very low percentage of natural stones that require further testing (Figure 2).

In the 'Advanced' mode, EXA offers the opportunity for the user to see the spectrum of the stone. This additional information can be extremely useful when working with stones that received a 'Refer' designation or in the identification of colored gemstones. So, in the 'Advanced' mode, EXA is far more than a 'natural diamond detector', it is in fact a sensitive scientific tool with many other different gemological applications

Basic Construction and Specifications

When you open the shipping container, you will find a solid steel and aluminium MAGI branded black box measuring 21cm x 23cm x 16 cm (8.3 x 9 x 6.3 inches), weighing 3.5 kg. Before switching on the machine, you must connect it to electrical 12 V power source via the adapter that is supplied with the unit and connect the fibre optic probe. The fibre optic probe has been specially designed to focus UV light onto the gem sample. It has seven fibres, six to illuminate the sample and the central one to collect the light response of the sample and transmit it to the spectrometer (Figure 3). Although EXA is not the lightest piece of gemological equipment, it can still be easily transported to any destination. For fieldwork, a 12V external power bank (Litionite Tanker 50000 mAh or similar) used for powering notebooks (universal 12V, 1A) could be employed with a 75Wh battery providing up to three hours of working time. The price for EXA is 6700 EUR, a price that positions it between traditional gemmological instruments and scientific spectrometers; it is the most affordable tool in MAGI Labs line (www.gemmoraman.com).

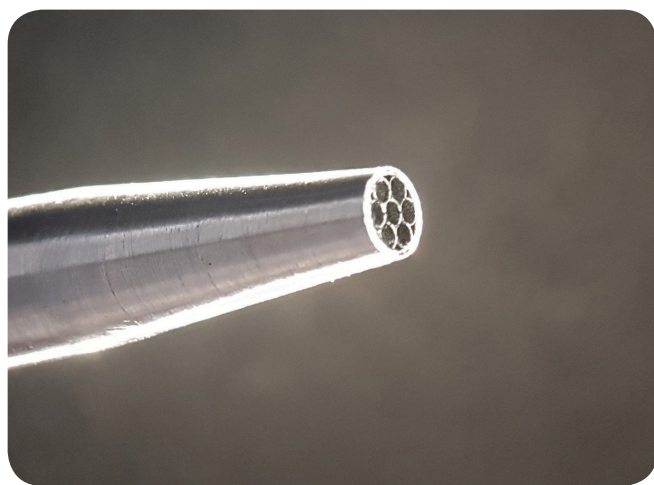


Figure 3. A close-up view of the tip of the fiber optic probe with six fibers around the outer portion, to illuminate the sample, and a central fiber to conduct the emitted radiation to the spectrometer.

After switching it on, you will find the Windows10 interface on an 8" touch screen. The EXA software interface incorporates the same 'MAGI' design, already familiar to many gemmologists who use instruments such as GemmoRaman, GemmoFTIR and GemmoSphere manufactured by the same company. The software guides you through the initial steps, such as the auto-calibration and switching on the UV-light source. It takes one minute before EXA is fully operational and ready to test. The Windows based software ensures upgradability of the software and the possibility to easily reload the system in the event it fails. On the back of the unit, there are two USB ports, which can be used for external memory or to add additional accessories, such as a USB Flash, mouse, keyboard or video converter to add an external monitor. A keyboard with a touchpad could be a good addition (Logitech K400 or similar) for saving the spectra, system updates or program settings.

Using EXA for the Identification of Diamonds

The software has two operational modes: 'Basic' and 'Advanced'. No specific training is needed to use EXA in the 'Basic' mode. To analyze the stone, the user merely points the tip of the probe towards the stone from a short distance without touching it and the result will be given on the screen almost instantly. Generally it takes 1 to 2 seconds to analyze each stone in a parcel or a stone set in a piece of jewelry. In 'Basic' mode, once the stone is illuminated by the probe, EXA analyses the fluorescence spectrum automatically and indicates either a 'PASS' or 'REFER' result on the screen (Figures 1 and 2) along with a corresponding sound signal. 'Basic' mode can be used for near-colourless diamonds with a 'PASS' reading indicating natural diamonds, while all synthetic diamonds, simulants and a very small percentage of natural diamonds will receive a 'REFER' reading. Many type IIa natural diamonds that receive a 'REFER' by less sensitive screening tools such as DiamondSure™ or instruments based solely on checking for transparency to short-wave UV light are easily detectable by EXA as natural diamonds. However, EXA does not detect type IIa colorless diamonds treated by HPHT to improve their colour. Since these are indeed natural diamonds, they are reported as such.

It is worth mentioning that on several occasions we have been asked by our clients to check small parcels of melee diamonds that were reported as 'REFER' after screening on other types of testers, especially those based on short-wave UV transparency. All of them were quickly identified as natural diamonds with EXA, and confirmed as type IaAB diamonds by FTIR spectroscopy, not IIa nor pure IaB diamonds that are known to be classified as 'REFER' by those machines. Possible explanation for these cases is a relatively low concentration of A-type nitrogen aggregates, responsible for SWUV absorption (Mikko Åström, pers. comment), so in small sizes such diamonds are reported as

SWUV-transparent even though they correspond to IaAB type when analyzed using FTIR.

While all synthetic diamonds and simulants will be reported as 'REFER', a small percentage of natural colorless diamonds with extremely low nitrogen concentrations will also have this reading. The manufacturers report that on average, 98% of natural diamonds can be positively identified using EXA. According to our experience, this percentage depends on the size of the stones being tested. In very small stones, less than 2mm in diameter, it is easier to find some natural diamonds with a 'REFER' reading, while in larger stones, even when analyzing jewellery set with hundreds of natural diamonds, often there are no stones that give a 'REFER' reading, eliminating the need for further testing.

In the 'Advanced' mode, instead of only a 'PASS' or 'REFER' result, the user will see the spectrum of fluorescent light emitted by the stone in real time (Figure 4). This mode of operation requires more training, but for a qualified user it offers a greater amount of information that is not available in the 'Basic' mode.

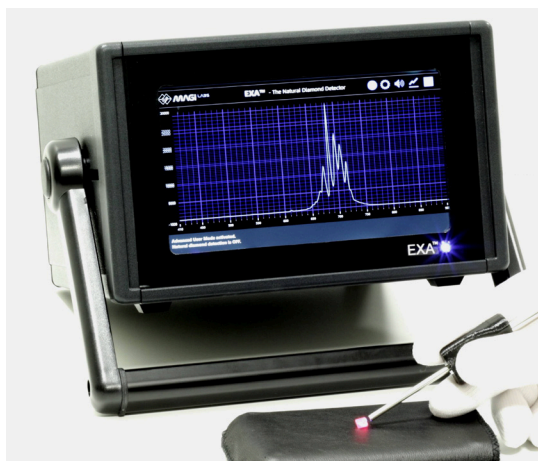


Figure 4. EXA operating in 'Advanced' mode analyzing a red spinel with its characteristic spectrum on the screen.

While in a majority of natural diamonds the characteristic peaks produced by N3 centers are easily seen, many synthetic diamonds and simulants that receive a 'REFER' also have their characteristics peaks in the spectrum. The peaks of Ni (883nm) in many synthetic HPHT diamonds, Si-V peaks (737nm) in many synthetic CVD diamonds (Figure 5) and the typical REE peaks in cubic zirconia will all lead to a positive identification of the stone. This is also the operational mode that can be used to analyze colored stones.

Using EXA for Colored Stones

At any time, while observing the spectrum in the 'Advanced' mode, the user can save the spectrum as a TXT file or as an image using the 'Save' button. There is also the capability to

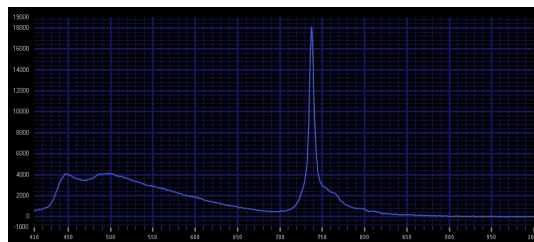


Figure 5. Silicon-Vacancy peaks (737 nm) are frequently seen in synthetic CVD diamonds when analyzed with EXA in 'Advanced' mode.

'freeze' the spectrum on the screen using the 'Pause' button to analyze it better. In this case, the library of characteristic spectra opens up on the left hand side of the screen and the user can go through the database comparing the spectra of tested material with typical spectra of gems previously recorded by MAGI (Figure 6). The user can also zoom on to certain areas of the spectrum, move the cursor to know the exact wavelength of the peaks (Figure 7) and superimpose the spectra from the library on to the spectrum recorded from the sample for comparison purposes (Figure 8). The current library version has 150 reference spectra, with the possibility of future upgrades from MAGI Labs.

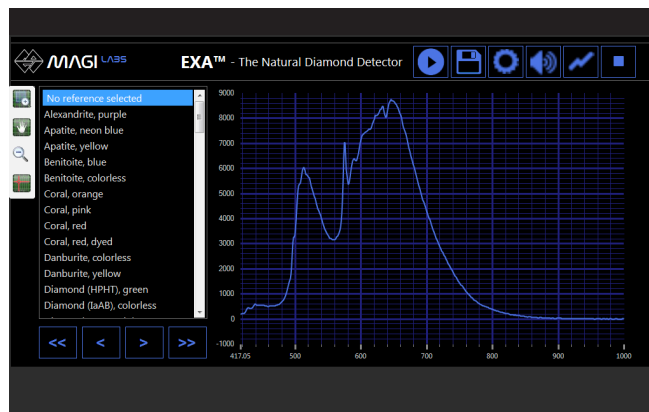


Figure 6. In 'Advanced' mode, after pressing the 'Pause' button on the touch screen, the library of reference spectra opens on the left hand side of the screen.

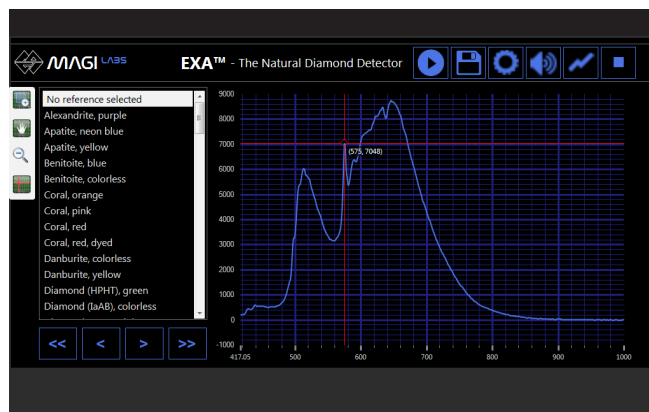


Figure 7. When spectrum from the sample is 'frozen' with the 'Pause' button, the user can zoom into every part of the spectrum and use the cursor to see the exact wavelengths of the peaks.

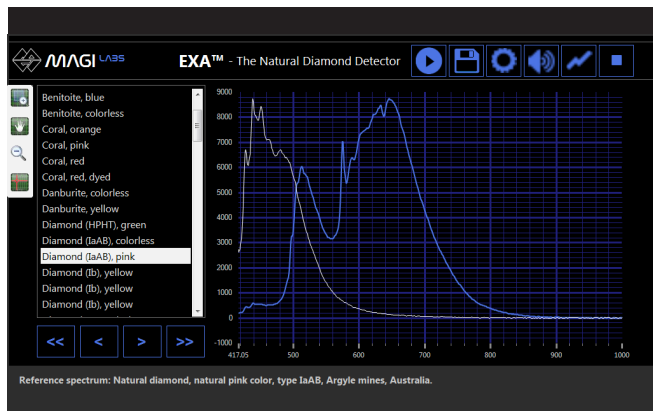


Figure 8. In 'Pause' mode, by clicking on the spectra from the library, they can be superimposed on the sample spectrum for comparison purposes. In this case, the spectrum of a natural pink diamond from the library (white line) is shown together with the spectrum collected from the sample of a natural pink diamond with color produced by a multi-treatment process (HPHT-irradiation-annealing, blue line).

As this tool is still quite new, we suspect that many more applications for colored stones analysis will appear in the future. Basically, any gem exhibiting fluorescence to long-wave UV light is expected to have a characteristic spectrum in EXA that could help to identify this gem from its imitations and sometimes even from synthetic analogues. Some examples of important applications for colored stones are listed below:

- Direct identification of many colored gemstones and synthetic materials (ruby, sapphire, emerald, alexandrite, spinel, tanzanite, tsavorite, imperial topaz, kunzite, CZ of different colors, and many others).
- Differentiation of natural versus synthetic spinel, and also identification of heat treatment in natural spinel.
- Observation of organic fillers (oil and artificial resins) in emeralds and other gemstones (Figure 9).

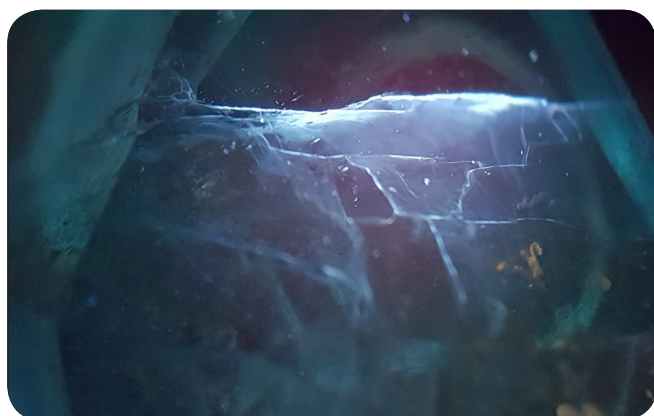


Figure 9. Fissures with organic fillers, such as oil or artificial resins, in emeralds and other gems exhibit yellowish to whitish fluorescence when illuminated with the EXA probe. Their fluorescent emissions can be seen in the spectrum of the sample in 'Advanced' mode. Possible differentiation of filler types on the base of its EXA spectrum is yet to be studied.

We successfully used EXA for checking large parcels of small faceted tanzanite, rubies, sapphires and emeralds. A characteristic spectrum of each gem was observed on the screen in real-time, so the testing of each stone took just a couple of seconds. Of course, EXA is not capable of distinguishing natural versus synthetic rubies, sapphires and emeralds, so additional checking will be needed for these gems, but at least imitations and other similar stones can be easily detected.

The same is true for the testing of small gems set in jewelry, when other methods cannot be used. It takes a very short time to check small mounted stones with EXA, and the method can also be used for large jewelry pieces without the need to even touch the object. This is extremely advantageous when studying objects in museums. The correct identification of the Black Prince's Ruby as a spinel in the Imperial State Crown of England could now be done very quickly with no need to even touch the stone!

Additional observations

As EXA analyzes the light coming from the gem and uses a very sensitive spectrometer, the instrument absolutely hates strong ambient lightning, especially fluorescent tubes. It is therefore highly recommended that any strong light be switched off when testing stones to avoid any contamination of the collected spectra from the ambient light. In the IGE Lab we often use a specially designed dark box when using EXA.

In many cases positive identification of natural diamonds and colored stones is possible directly through a transparent plastic bag or plastic gem box without opening them. However, strongly fluorescent materials used sometimes as a base for a gem can hide its own spectrum, so it is recommendable to test the stones against a black gem tray provided with the EXA, made of special material that is very inert to UV light.

Some gems are set into jewelry very close to each other, either in a row or pave-set. In such cases a stone with strong fluorescence can 'contaminate' the spectrum of its neighbors and thus lead to incorrect results. To avoid this, the excitation light beam can be reduced with a special tip provided with the unit and placed on the probe. Moreover, a diaphragm made of black opaque material can be placed over the analyzed gem to avoid any fluorescence light coming from other closely located stones.

EXA uses strong long wave UV light, which is almost invisible yet harmful to the human eye. Therefore, the user should never look directly at the probe end and it is advisable to use the polycarbonate safety goggles that are supplied with the unit, during prolonged use of the instrument.

Conclusions



Figure 10. Checking small natural diamonds set in jewelry becomes a very easy task with EXA.

gemological laboratories, jewelry appraisers, auction houses, pawnshops and any firms dealing with loose and mounted diamonds or colored stones from unknown sources.



Figure 11. Even very small mounted natural diamonds can usually be easily identified with EXA.

Competing with other natural diamonds identification tools in a similar price range (GIA id100, numerous phosphorescence tools), it wins thanks to the possibility of the direct observation and analysis of the spectra in the 'Advanced' mode. This feature gives EXA versatility for diamond analysis and also for a number of other gemological applications. The large database of reference spectra is very helpful for spectra interpretation and it is expected to grow in the future. The traditional great 'after' support provided by MAGI Labs is also a very positive additional feature for users.



AUSTRALIAN OPAL CENTRE

LIGHTNING RIDGE • NSW

A not-for-profit organisation building Australia's premiere public collection of opal and opalised fossils; developing a centre for excellence in opal-related geological, palaeontological and gemmological research, education and training, heritage, arts, travel, community, cultural and economic development.

JOIN. Members in 11 countries and counting. Join now to be the first to receive news, updates and benefits.

DONATE to the Building Fund or Acquisition Fund. Receive a limited edition dino clay medallion and your name in the new Centre in perpetuity.

BECOME A BENEFACTOR.

Contact us to discuss opportunities for major benefaction.

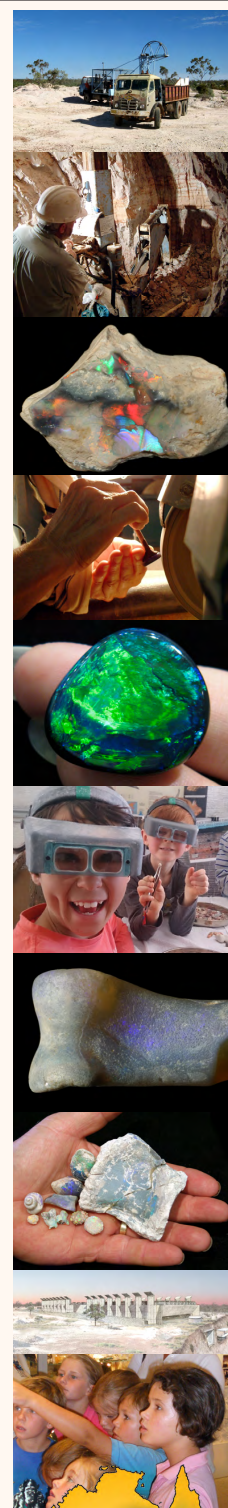
DONATE to the COLLECTION.

A home for your treasured opals, opal jewels, specimens and fossils, opal-related publications, artifacts and artworks. Leave a legacy.

KNOWLEDGE & EDUCATION.

Looking for opal-related information, training or services? Talk to us about your needs.

www.australianopalcentre.com
contact@australianopalcentre.com



IDEX IT'S GUARANTEED



THE EASY,
SMART AND
AFFORDABLE
WAY TO BUY
AND SELL
DIAMONDS



FOR ADDITIONAL INFORMATION ABOUT IDEX ONLINE

Visit: www.idexonline.com

Email: support@idexonline.com

or contact your nearest

IDEX Online representative

Antwerp +32-3-234-1157

Mumbai +91-22-6127-3333

New-York +1-212-382-3528

Ramat-Gan +972-3-612-8995

IDEX ONLINE DIAMOND TRADING NETWORK

DEBORAH MAZZA studied gemmology at the DGemG (Germany), completed her FGA, and later her Diamond Diploma also through the DGemG and the Certificate of Appraisal Theory through the National Association of Jewellers. In this issue Deborah looks at two gem faceters; Jean-Noel Soni and Nicholas Yiannarakis, their work and their passion.



Chasing the Light

Jean-Noel Soni

Jean-Noel of Top Notch Faceting is a self-taught gemstone lapidary based in San Francisco, and leads the new generation of gemstone lapidaries who adhere to the new norm of searching what is best for the gem, and refuse the canonised cut.

His reputation has quickly grown amongst his peers for his respect of the crystal, his main concern is in the stone he is cutting, and the result is against all expectations. One of Jean's main interests is ethically sourcing the rough himself, bypassing the existing duality of commercialisation and making sure he pays the source a fair price. He believes in maximising the beauty of the gem by not cutting it in a canonised standard cut with high weight loss, he obtains better results with the challenge of accepting the shape the crystal is presented in, minimising weight loss, cutting bigger facets that take longer and more care in polishing, but obtaining beautiful colours, reflection and brilliance with movement of light. His faceted cuts are like carvings of the gem, the gems become small sculptures that need custom made settings for jewellery; he knows the gems are finite material and therefore creates infinity in beauty for them. He doesn't think of himself as an artist, but he is effectively a natural.



Afghan Tourmaline - 15 carats (Courtesy of Top Notch Faceting)

Nicholas Yiannarakis

Another example of the young generation of gemstone cutters is Nicholas Yiannarakis, a goldsmith classically trained in his native Greece who finished his education in London where he relocated over 30 years ago. Nicholas Yiannarakis is also a gem cutter, he was always passionate about antique jewellery and was especially intrigued by Renaissance pieces and the mesmerising effect gemstones have on man. His journey in faceting could be compared to the trial and error process employed in traditional faceting of the past centuries; Nicholas chased the light in his work before he arrived at his contemporary design. Inspired by Renaissance faceting, which for him is closer to the platonic view of true beauty, more elemental than contemporary faceting, and fascinated by the free flowing forms of nature, he wondered if he could combine the same flow in gems with light reflection. The first results were unsatisfactory before he realised the problem was in the canonised cut. After many attempts, and realising that he needed some engineering skills, he finally found a way to combine the light performance he wanted, the weight retention and the aesthetics he desired for the stone; the results are simple clear forms, great optical performance and stones that still retain the memory of their crystal outline. He then designs the jewellery around the cut gems, and remains true to his original platonic ideals.



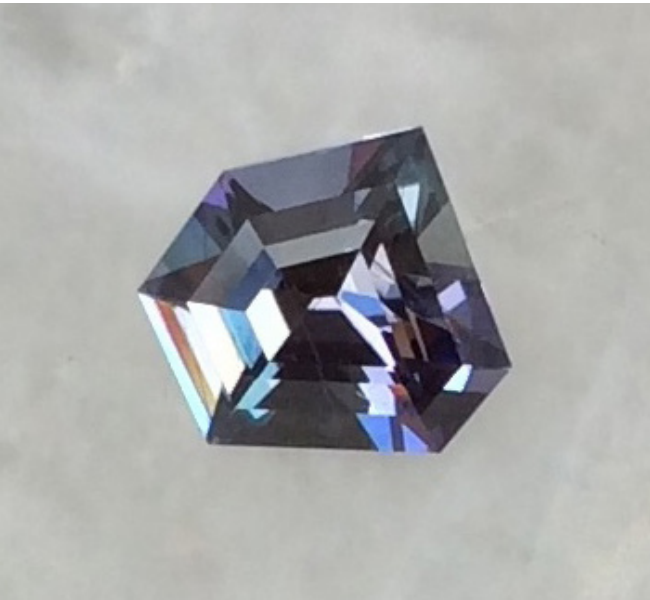
Peridot & Tanzanite (Courtesy of Nicholas Yiannarakis)



Pink Tourmaline Earrings (Courtesy of Nicholas Yiannarakis)



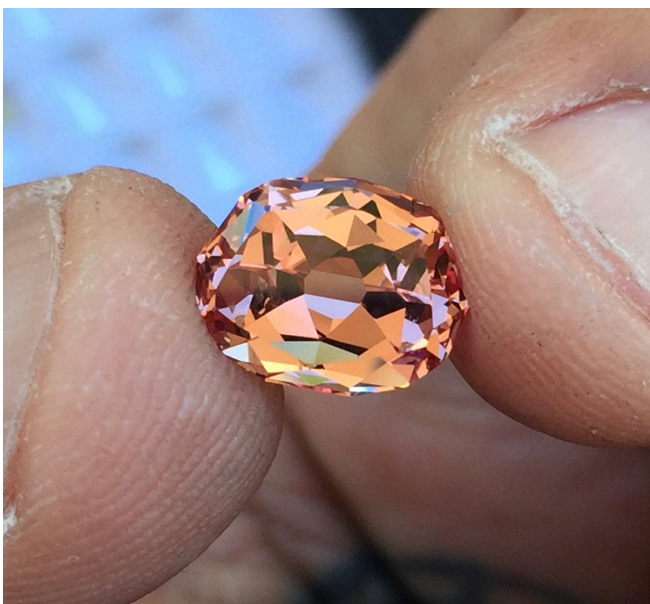
Brazilian Amethyst 4.60 carats (Courtesy of Nicholas Yiannarakis)



Untreated Tanzanite 1.80 carats (Courtesy of Nicholas Yiannarakis)



Aquamarine (Zambia) 1.80 carats (Courtesy of Nicholas Yiannarakis)



Garnet (Mahenge) 7 carats (Courtesy of Top Notch Faceting)



Citrine Quartz (Courtesy of Nicholas Yiannarakis)

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. To recognise this, we introduced two new 'Diploma' programs (Diamond Professional and Coloured Gemstone Professional) in 2018.

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,

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 to estimate the weight of '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.

Diamond Professional Program

Designed specifically for those engaged in the diamond trade, this program covers the same theoretical information covered in our 'Diamonds' course plus our eight-day Diamond Grading and Lab-created Workshop.

Coloured Gemstone Professional Program

If your area of expertise is coloured gemstones, this program is ideally suited for you. The CGP program involves the completion of four theoretical courses (Basic Gemmology, Advanced Gemmology, Gem Identification and Coloured Gemstones) plus our two five-day practical Gem Identification workshops, our five-day Coloured Gemstone Grading #1 workshop, our five-day Lab-created and Treated Gems workshop plus our 100 hour online Coloured Gemstone Grading #2 course.

Courses in Other Languages

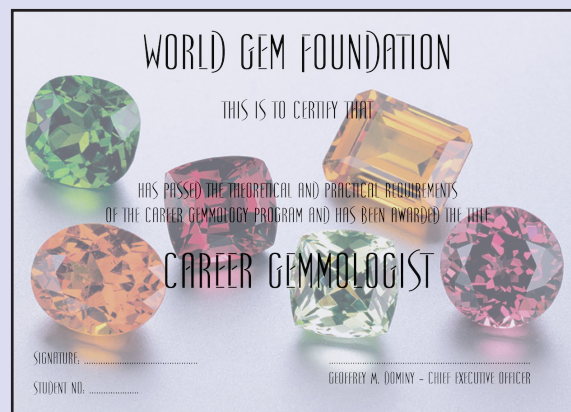
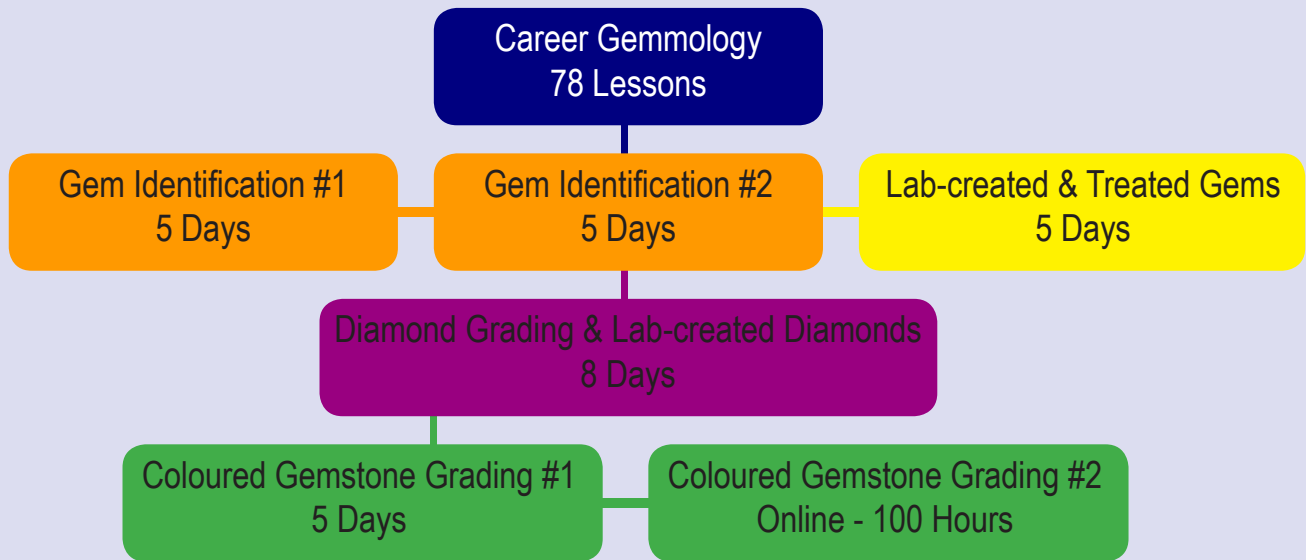
We are currently translating all of our 'Diploma' program courses into Spanish and Chinese to meet the needs of our Spanish and Chinese speaking students.

Currently our Gemología Básica (Basic Gemmology) and Gemología Avanzada are available in Spanish in digital, print and also online.

General Interest Courses

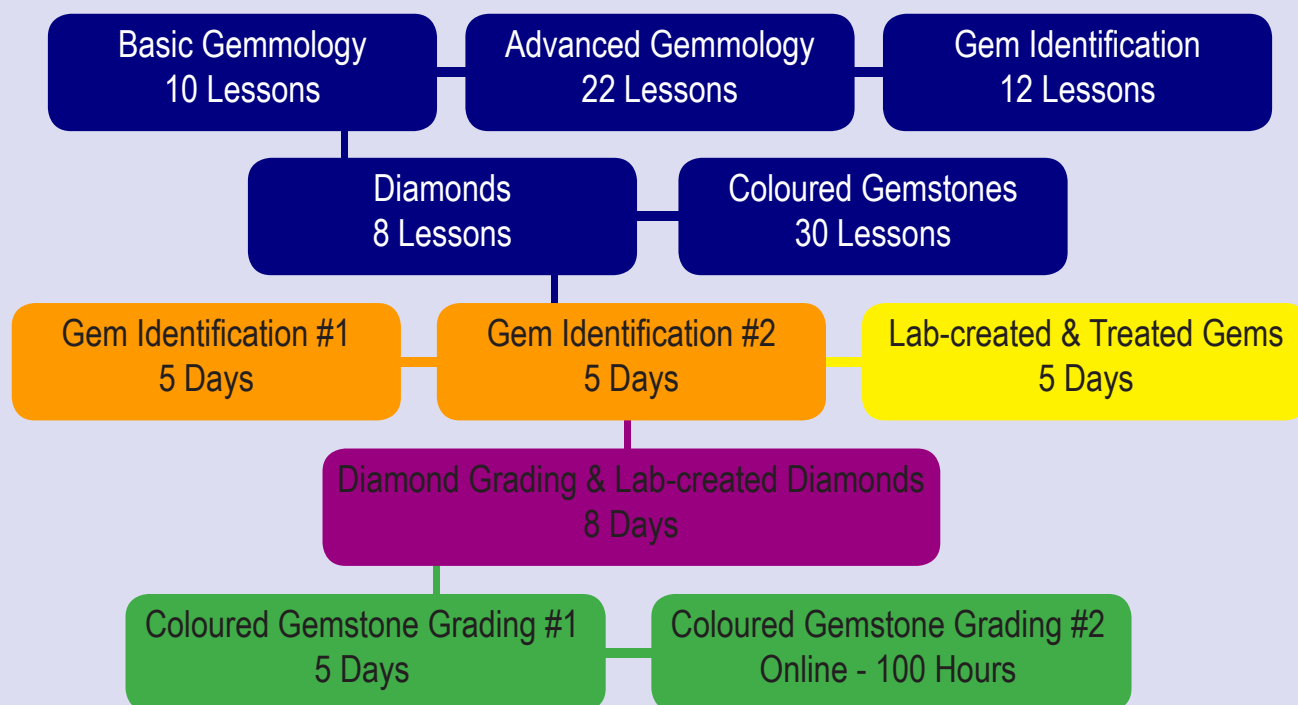
For those interested in gemstones but not wishing to take our 'Diploma' programs, all of our theory courses can be taken independently without prerequisites. In addition to the six theoretical courses (Career Gemmology, Basic Gemmology, Advanced Gemmology, Gem Identification, Diamonds and Coloured Gemstones) that make up our Career Gemmologist, Diamond Professional and Coloured Gemstone Professional 'Diploma' programs, we also offer three 'General Interest' courses (Rubies, Sapphires and Emeralds, Opals and Jade and Organic Gems).

GEMMOLOGY SEVEN PROGRAM



Career Gemmology Seven	Digital Fees			Printed Fees		
Course Name	Euros	Pounds Sterling	USD	Euros	Pounds Sterling	USD
Career Gemmology (Theory)	1400	1100	1600	1570	1235	1795
Gem Identification #1	500	400	550	500	400	550
Gem Identification #2	500	400	550	500	400	550
Coloured Gemstone Grading #1	500	400	550	500	400	550
Coloured Gemstone Grading #2	1000	800	1150	1000	800	1150
Diamond Grading/Lab-created Diamonds	1750	1400	2000	1750	1400	2000
Lab-created & Treated Gems	500	400	550	500	400	550
Examinations Fees (Final Exam)	250	200	280	250	200	280
Total Cost	6400	5100	7230	6570	5235	7425

GEMMOLOGY ELEVEN PROGRAM

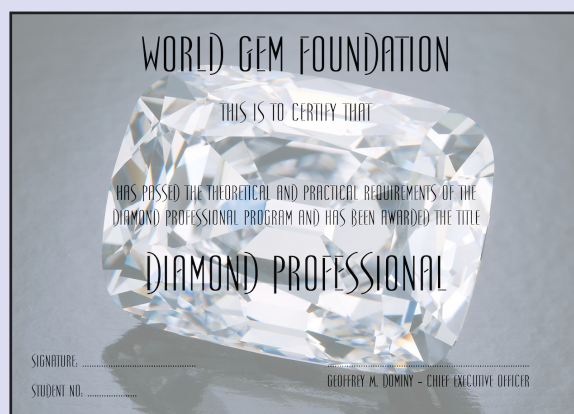


Career Gemmology Eleven				Digital Fees			Printed Fees		
Course Name	Euros	Pounds Sterling	USD	Euros	Pounds Sterling	USD	Euros	Pounds Sterling	USD
Basic Gemmology (Theory)	200	150	225	235	180	265			
Advanced Gemmology (Theory)	400	300	450	430	325	485			
Gem Identification (Theory)	225	175	250	255	200	285			
Diamonds (Theory)	225	175	250	255	200	285			
Coloured Gemstones (Theory)	500	400	550	565	450	625			
Gem Identification #1	500	400	550	500	400	550			
Gem Identification #2	500	400	550	500	400	550			
Coloured Gemstone Grading #1	500	400	550	500	400	550			
Coloured Gemstone Grading #2	1000	800	1150	1000	800	1150			
Diamond Grading/Lab-created Diamonds	1750	1400	2000	1750	1400	2000			
Lab-created & Treated Gems	500	400	550	500	400	550			
Examinations Fees (Final Exam)	250	200	280	250	200	280			
Total Cost	6550	5200	7355	6740	5355	7575			

DIAMOND PROFESSIONAL

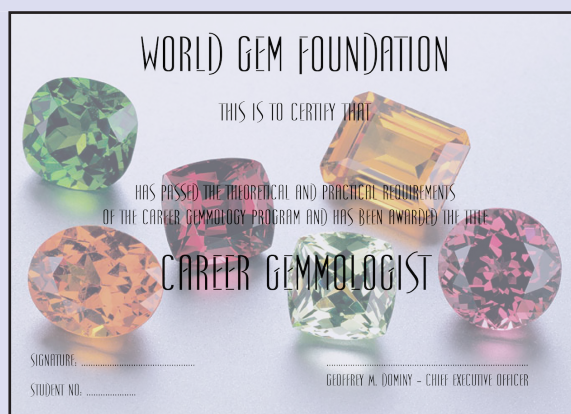
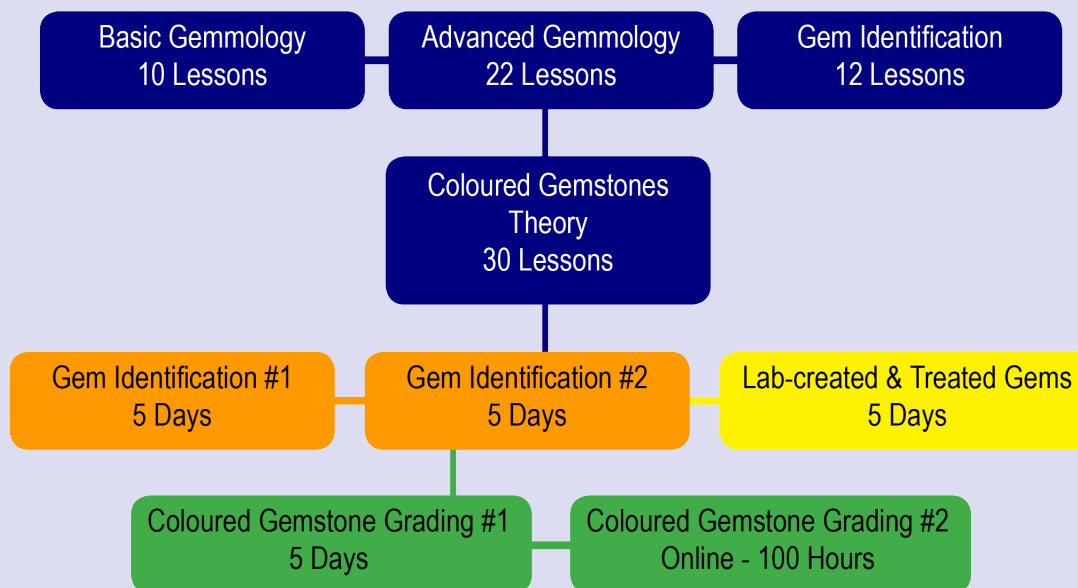
Diamonds
Theory
8 Lessons

Diamond Grading & Lab-created Diamonds
Practical Workshop
8 Days



Diamond Professional	Digital Fees			Printed Fees		
Course Name	Euros	Pounds Sterling	USD	Euros	Pounds Sterling	USD
Diamonds (Theory)	225	175	250	255	200	285
Diamond Grading/Lab-created Diamonds	1750	1400	2000	1750	1400	2000
Examinations Fees (Final Exam)	250	200	280	250	200	280
Total Cost	2225	1775	2530	2255	1800	2565

COLOURED GEMSTONE PROFESSIONAL



Coloured Gemstone Professional	Digital Fees			Printed Fees		
	Euros	Pounds Sterling	USD	Euros	Pounds Sterling	USD
Basic Gemmology (Theory)	200	150	225	235	180	265
Advanced Gemmology (Theory)	400	300	450	430	325	485
Gem Identification (Theory)	225	175	250	255	200	285
Coloured Gemstones (Theory)	500	400	550	565	450	625
Gem Identification #1	500	400	550	500	400	550
Gem Identification #2	500	400	550	500	400	550
Coloured Gemstone Grading #1	500	400	550	500	400	550
Coloured Gemstone Grading #2	1000	800	1150	1000	800	1150
Lab-created & Treated Gems	500	400	550	500	400	550
Examinations Fees (Final Exam)	250	200	280	250	200	280
Total Cost	4575	3625	5105	4735	3755	5290

Rubies, Sapphires & Emeralds

This course focuses on three coloured gemstones (rubies, sapphires and emeralds) that individually and collectively are considered the cornerstones of the coloured gemstone trade. Lessons include a complete overview of their physical and optical properties, principal sources, mining, how they can be identified from gemstones that can be deceptively similar in appearance and their lab-created counterparts, common treatments and enhancements, pricing guidelines, what constitutes the best quality and how to properly care for them.

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.

Online Tutoring

While clearly the ideal way to learn a particular subject is with one-on-one tutoring, we appreciate that this is difficult when you enrol in a long distance study program.

Fortunately, new distance learning technologies are changing. Now teachers can connect with their students virtually using a variety of virtual tutoring tools, such as Skype.

The chart below outlines the number of online tutoring hours that are included in your course price. If you require more online instructional tutoring, please contact your education coordinator to discuss availability and pricing.

Course Name	Hours
Basic Gemmology - Theory	2
Advanced Gemmology - Theory	4
Gem Identification - Theory	2
Diamonds - Theory	2
Coloured Gemstones - Theory	5
Career Gemmology - Theory	14

We strongly suggest that you contact your instructor beforehand by email with your questions so that you will derive maximum benefit from your online session. Please remember that these sessions are designed to provide you with 'coaching' rather than direct instruction.

Course Fees

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.

Practical Workshops

Gem Identification #1



Dates & Venues: TBA

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 & Venues: TBA

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.

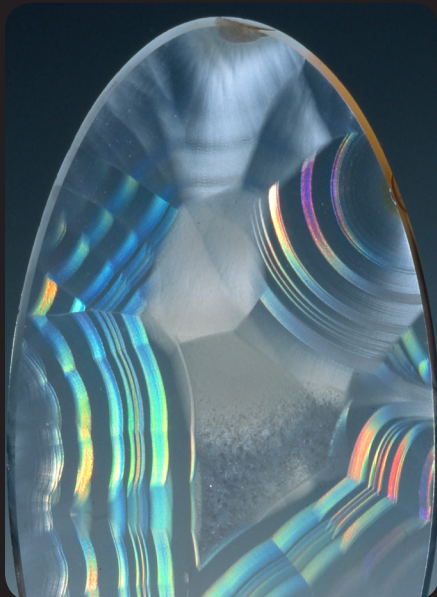
Prerequisites: Gem Identification #1 or Equivalent

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.

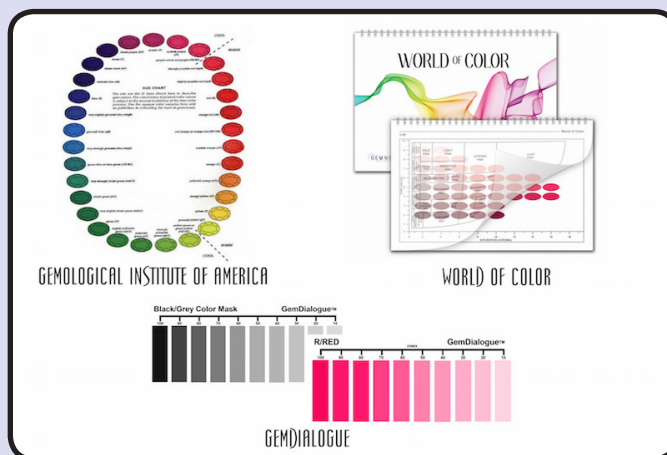
Prerequisites: None



Dates & Venues: TBA

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.

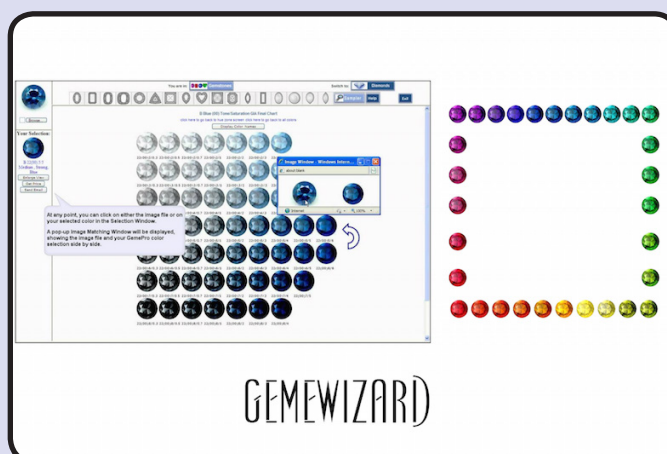
Prerequisites: None



Online Course

Course Cost € 1000

[Reserve Your Place Now](#)



Practical Workshops



Dates & Venues: TBA

Course Cost € 500

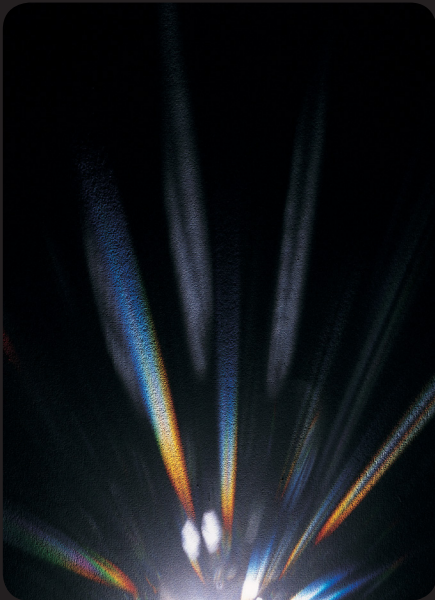
[Reserve Your Place Now](#)

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 & Venues: TBA

Course Cost € 1750

[Reserve Your Place Now](#)

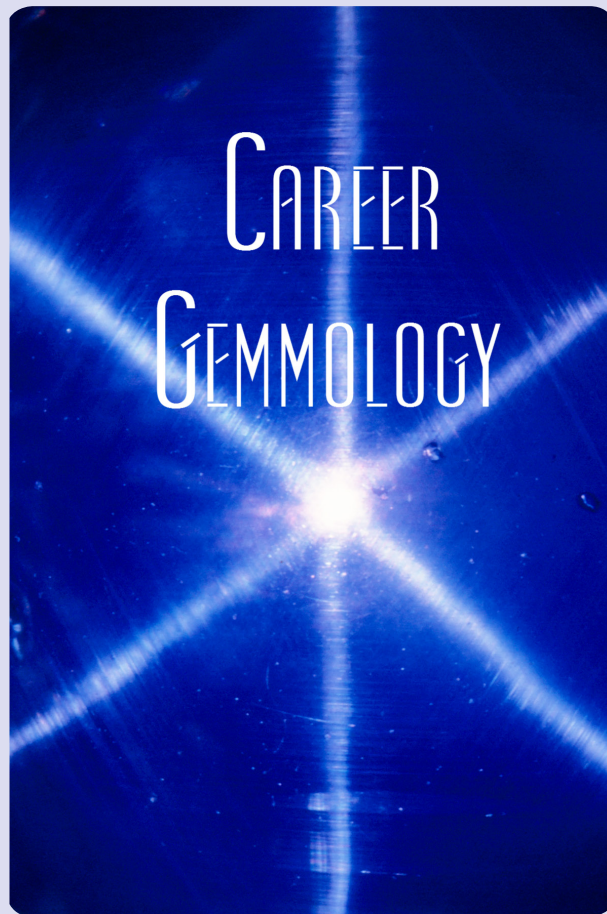
Diamond Grading & Lab-created Diamonds

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



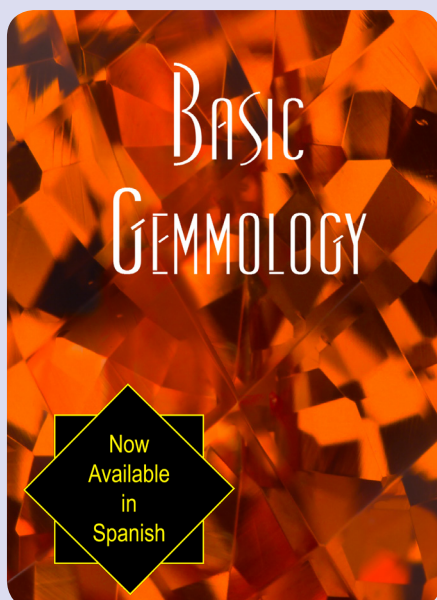
Course Content

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: This course includes all the information contained in the Basic Gemmology, Advanced Gemmology, Gem Identification, Diamonds and Coloured Gemstones 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

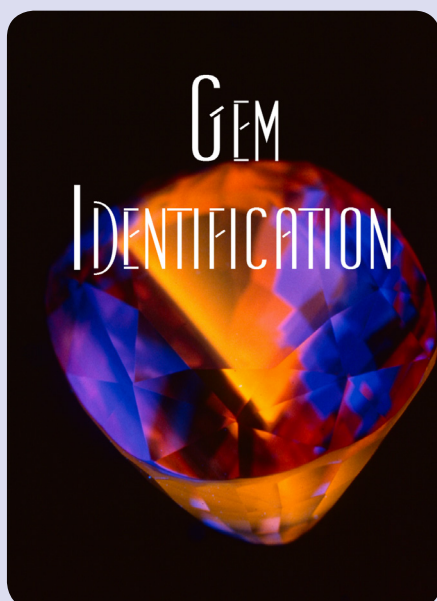


Course Content

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

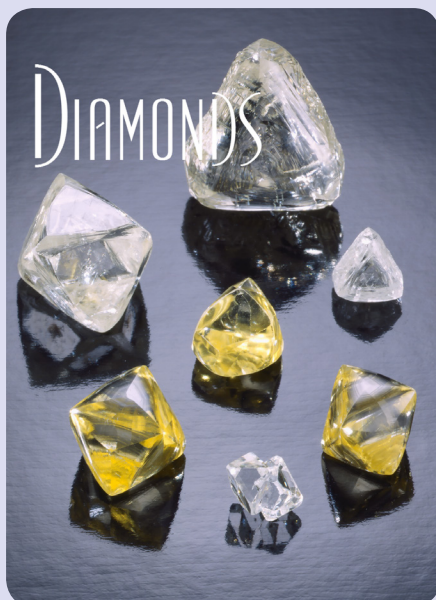


Course Content

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

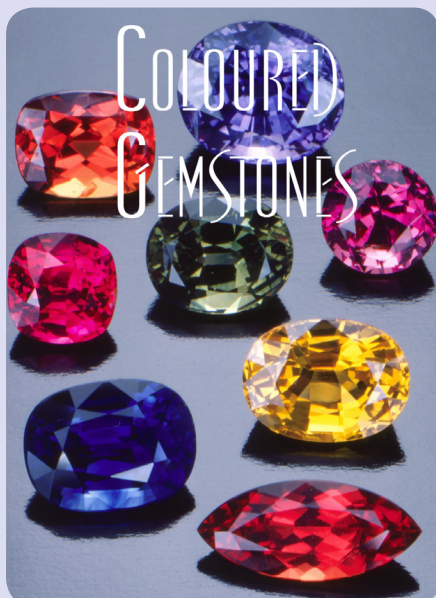


Course Content

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

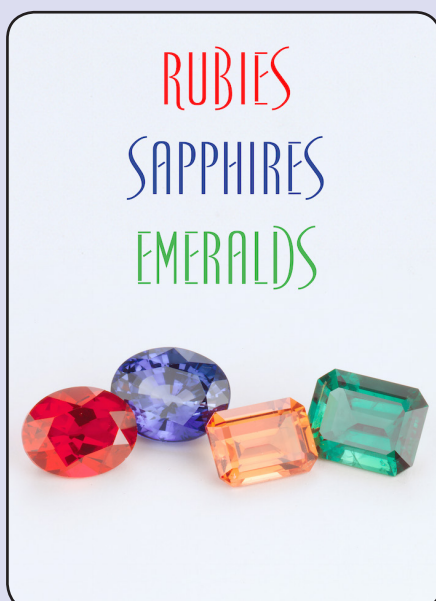


Course Content

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 include a complete overview of their physical and optical properties, principal sources, mining, how they can be identified from gemstones that can be deceptively similar in appearance and their lab-created counterparts, common treatments and enhancements, pricing guidelines, what constitutes the best quality and how to properly care for them.

Course Cost: € 95

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



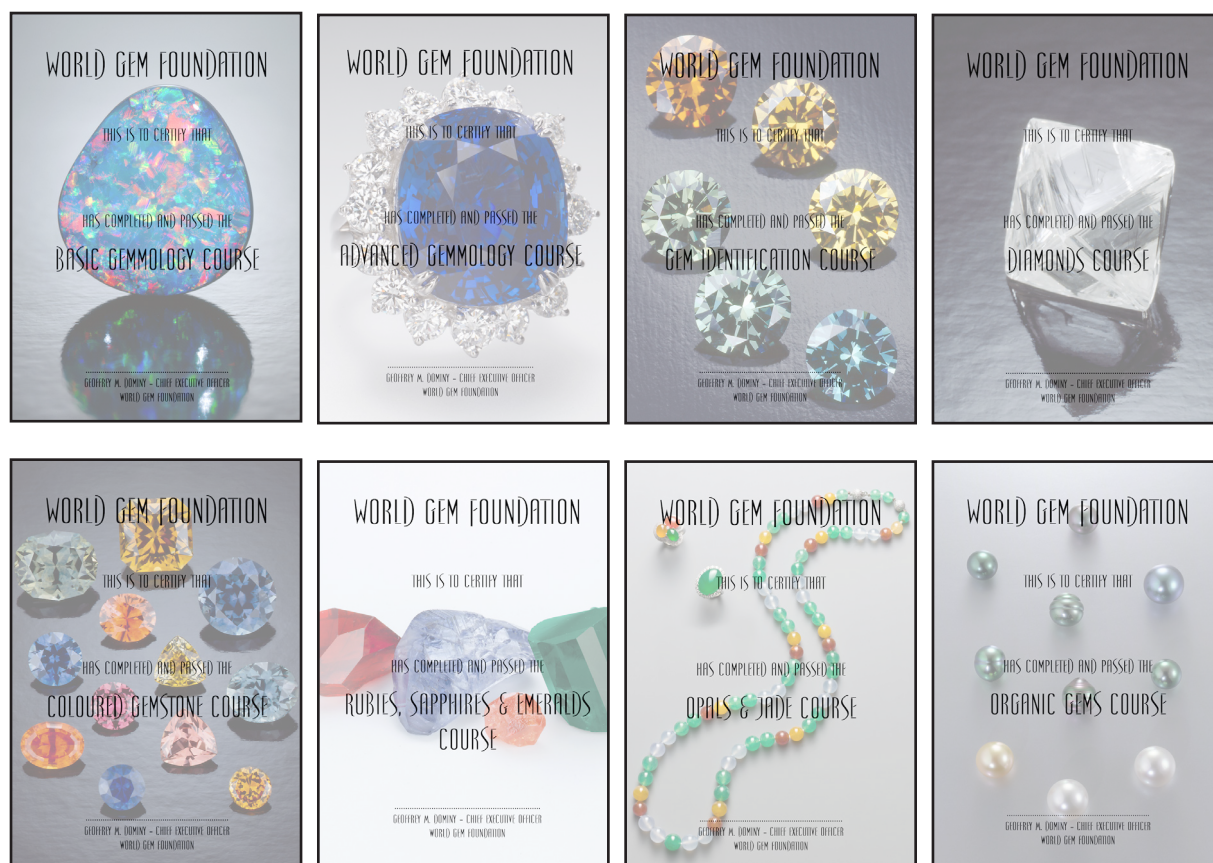
Course Content

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

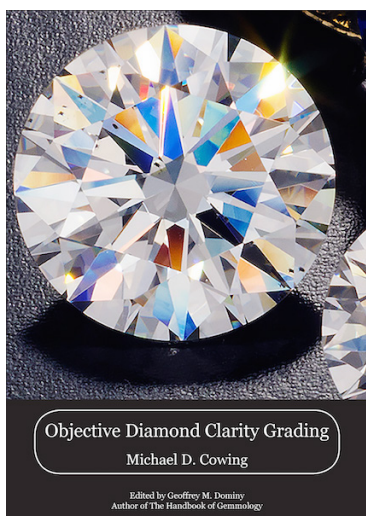
Theory Courses - Letters of Completion



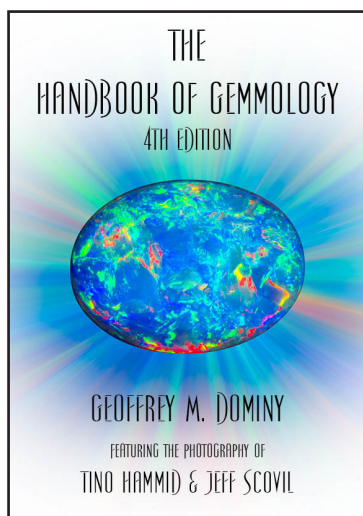
Practical Workshop - Letters of Completion



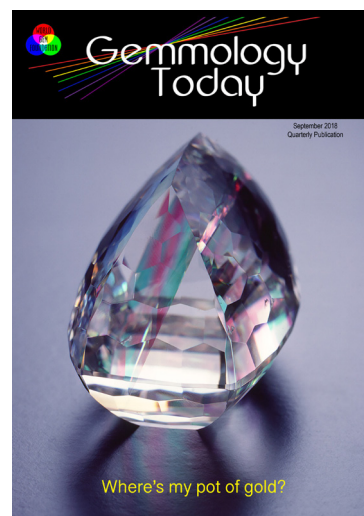
Four Great Publications



Digital Edition
\$ 19.95 USD



Digital Edition
\$ 49.95 USD



Digital Edition
FREE

Two Volume Printed Edition
from 309 euros including shipping

The main focus of Amazonas Gem Publications is to give authors of gemmological publications access to digital technology that allows them to market their work in new and innovative ways.

Unfortunately with traditional publishing houses, authors are often faced with restrictive policies that can in some cases cause them to lose control of the very product they created. Due to publishing economics, future editions are invariably decided not on the need to update important information but on profitability. This has, in the past and will undoubtedly in the future, prevent important works from being revised and essential information preserved in the public domain.

At Amazonas, we want to celebrate our authors, the creative process they have gone through, give them support and encouragement and most importantly create a viable platform that allows them to receive maximum exposure and maximum profitability.

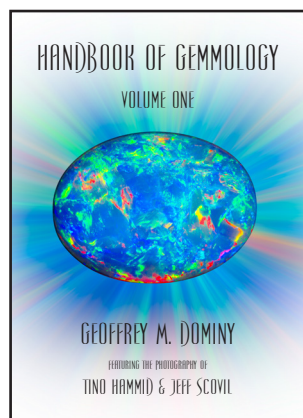
Are we a traditional publishing house? Absolutely not! Why would we want to be? We are here to support our major stakeholders; our authors and those who support their work!

If you are an author and would like to learn more about us or you would simply like to purchase either Objective Diamond Clarity Grading or the Handbook of Gemmology, please visit our website at:

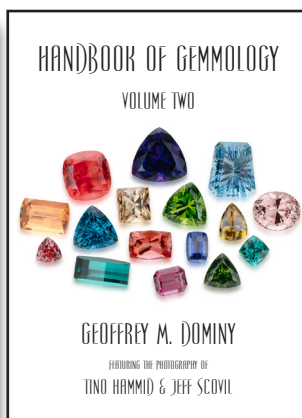
www.amazonasgempublications.com



First time available in PRINT!



738 Pages



618 Pages

€ 309 (Europe)

€ 329 (Rest of the World)

PRICES INCLUDE SHIPPING

European Orders include shipments to: Austria, Albania, Andorra, Belarus, Belgium, Bosnia and Herzegovina, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Kosovo, Latvia, Liechtenstein, Lithuania, Luxembourg, Macedonia, Malta, Moldova, Monaco, Montenegro, Netherlands, Norway, Poland, Portugal, Romania, San Marino, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland & United Kingdom.

VOLUME ONE covers the science of gemmology, including the chemical nature of gemstones, their physical and optical properties, basic crystallography, the absorption of light, the spectroscope, polarized light, the polariscope, pleochroism, the dichroscope, colour filters, specific gravity, luminescence, magnification, thermal conductivity, imitation, assembled and lab-created gemstones, gemstone treatments and enhancements, mining, diamond and coloured gemstone cutting and coloured gemstone and diamond grading.

VOLUME TWO covers the identification of gemstones based on their colour and transparency, 'Reflections', consisting of 134 pages of photographs that capture the true beauty and talent of award winning gem cutter John Dyer, and GEMFACTS™ focusing on the seventeen most common gem species and varieties.

Featuring the photography of internationally renowned gemstone/mineral photographers Tino Hammid & Jeff Scovil, Conny Forsberg, John Dyer, David Dyer, Lydia Dyer, Priscilla Dyer, Ozzie Campos, Dmitry Stolyarevich, Arjuna Irsutti and Sergey Pryanechnikov.

1428 Colour Photographs and 191 Diagrams and Illustrations

What people are saying about the Handbook of Gemmology:

Dick Hughes writes 'Your books just arrived, safe and sound. Wow! Fantastic piece of work. My hat's off to you. YESSSSS!!!

Kathi writes 'Absolutely THE best book on the subject so far. Beats any other publication I have. Handbook is the wrong word, though!

Bruce writes 'Geoff, I think your work, as exhibited in your 2-volume Handbook of Gemmology is the definitive exposition on the subject. I thought Webster's original work and its progression in the 70s was the best treatment on the subject for many years, but your contemporary work far surpasses his accomplishment. Just as Deere, Howie & Zussman's Rock Forming Minerals is the definitive multivolume set for mineralogists and petrologists, and Koivula and Gubelin's 3-volume work on inclusions sets the standard on inclusion information, with Alan Hodgkinson's Gem Testing Techniques providing landmark information on that subject; your work on the science of gemmology is the finest and most complete exposition on the subject I have ever encountered. Congratulations on your efforts, and your prescience in making the work available both electronically, and in published volumes'.

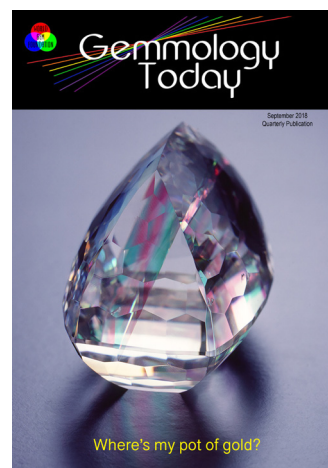
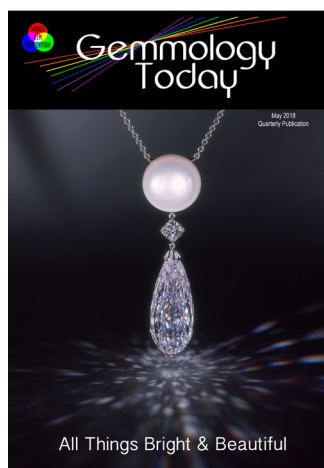
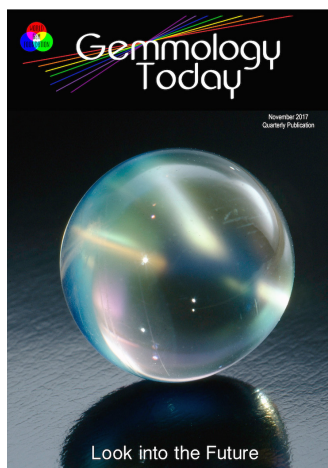
'A must buy for any gemmologist, student or jeweller'

Gemmology Today in Print?

CURRENT ISSUES

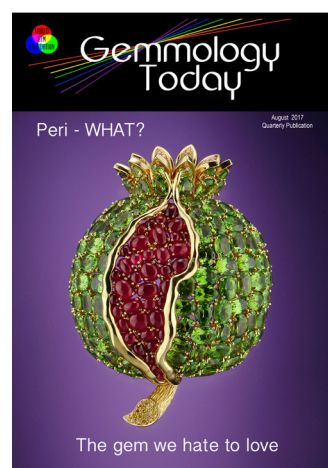
We are delighted to offer as a 'set of four', the last four issues of Gemmology Today; each individually bound.

To order your set, please click on the 'ORDER TODAY' icon below. The price is € 65 (Holland), € 75 (European Union) and € 85 (Outside Europe) and includes shipping and handling. All orders are shipped from Holland.



BACK ISSUES

We still have a few issues from November 2016, February 2017, May 2017 and August 2017.



or order all eight issues!

Order Today!

Meet the Team



Meet our team of dedicated professionals who all share a common philosophy, a common goal and a passion and commitment to gemmology and education.



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 fourth 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 has just released a 5th Anniversary Printed Edition (Two Volumes).

He 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 led 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 led 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 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.



Jan Asplund
Scandinavian Gem Academy



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 was born in Paris France where he studied Art and Design and graduated from Ecole Boulle. 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 gemological 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.



Gérard Raphaël Quintin
South American Gem Academy



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.

Kyalo Kiilu is a fellow of the Gemmological Association of Great Britain (Gem-A) and an Alumnus of Birmingham City University where he obtained his BSc with honours in Gemmology and Jewellery Studies in 2017.

His passion for gemstones can be traced back forty years to his late grandmother's village in rural Kenya and the prospecting trench dug by the first British gemstone explorers in the early part of the 20th Century.



Kyalo Kiilu
Kenyan Gem Academy

While pursuing his pharmaceutical studies, his interest in gemstones never diminished. Unfortunately in 2003 there were no colleges in Kenya offering gemmological courses so he decided to relocate to England and enrolled in Gem-A's Diamond Diploma program in 2004; the start of his gemmological journey.

Kyalo is a licenced gemstone prospector in Kenya and in 2015 made a discovery of a very unique sapphire, resembling another Kenyan sapphire marketed as 'Goldsheen Sapphire' that he will hopefully share with the gemmological community very soon.

He comes to the World Gem Foundation and specifically the Kenyan Gem Academy with a strong desire and ambition to share his knowledge of gemstones with his fellow Kenyans, particularly those involved in the production of gemstones, gemstone lovers and aspiring gemmologists, to provide support and encouragement that was so lacking in the industry when he was growing up in Kenya.



Salomon Lutumba
Gem Academy of DR Congo

Salomon Lutumba is an alumnus of Birmingham City University where he graduated with a Bachelor in Science with honours in Gemmology and Jewellery studies in 2016. He also holds a Diamond Diploma and Gemmology certificate from Gem-A. He is originally from the Democratic Republic of Congo.

In 2002 he relocated to England where, ten years later, he found the opportunity to fulfil his dream of studying gemmology at the Birmingham City University. In 2012, he started his High National Diploma in Gemmology combined with Gem-A's Diamond and Gemmology program which led to a degree program, introduced for the first time in 2015, at the BCU.

Today, by embracing the World Gem Foundation's concept and philosophy of gemmological education, and through the Gem Academy of DR Congo, he would like to share his passion and knowledge of gems with his fellow Congolese; particularly jewellers, aspiring gemmologist and gemstone lovers.

His personal goal is to promote the science of gemmology in his country, by providing information and support to empower people in the jewellery business and those trading in stones.



Jack Ghazalian
American Gem Academy
Director of Corporate & Career
Development

Jack Ghazalian has thirty-eight years of experience in the jewelry industry. He is a graduate gemologist through the Gemological Institute of America (1992), was an instructor for GIA (1993) and was officially Certified-by-the-State of California Education Code 94311(a) to teach Gemology & Jewelry Manufacturing-Arts (1993).

In October 2015, he was honored by the International Distinguished Scholars – Academic Honor Society as an 'International Distinguished Scholar' and in 2017 was granted membership in Kappa Delta Pi. He is currently the owner of Isometric Gemological Appraisal Services in Southern California: IsometricGems.com, speaks five languages and is passionate about education.

Stand out from the crowd

"Education inflames our intellect and makes us grow. It widens our horizons, adds value to our name and instills in our clients, staff, management and industry colleagues, a confidence in our ability that can only be gained from being assessed to the highest of standards by our peers."

Kym Hughes
President NCJV

So become enlightened
and
Stand out from the crowd



ncjv.com.au | edu@ncjv.com.au

The 'Real' Madrid - Indulge Yourself!

There are certain cities that immediately capture our imagination. Paris, London, New York, Rome, Rio de Janeiro, Tokyo and Berlin all have a certain 'magic' to them and without question, Madrid belongs in this exclusive group of 'must-go' places to visit. It truly is a wonderful city to explore and soak up the Spanish culture.

Having attended many trade shows as both an exhibitor and an attendee, I can tell you that the experience isn't always a positive one. The preoccupation with trade show organizers to continually increase the number of exhibitors and the cost of their booth rentals often leaves exhibitors with an ever decreasing share of the 'trade-show pie', making it impossible to cover their costs, let alone make a profit. Of course the organizers will point out that trade shows are not just about 'sales' but also the potential new contacts you can make. True but 'future' business is an untangible that is simply impossible to predict.

The intimacy of the EXPOGEMA 2018 (thirty-two exhibitors in a beautiful exhibition hall of 365 square metres), the low cost of renting space (€ 120 per metre), free admission to

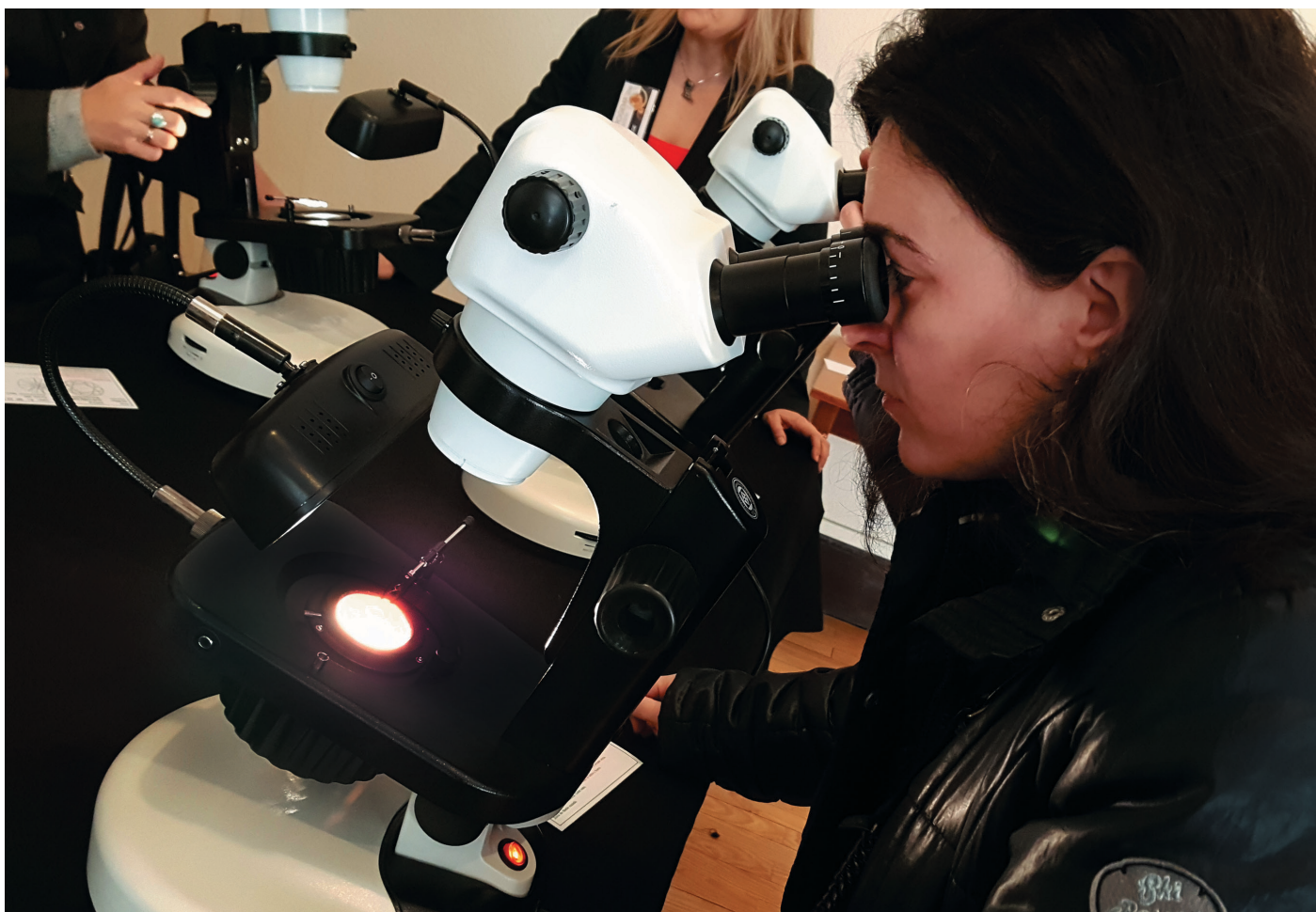
the public and the higher than normal visitor to exhibitor ratio made this years show different to other trade shows. The opportunity for exhibitors to interact with each other and forge new business relationships and the visitor traffic ensured that the exhibitor hall was always buzzing.

In addition to the trade show, attendees had the opportunity to visit the Don Felipe de Borbón and Grecia Historical-Mining Museum, and the Marcelo Jorissen Mine. The Spanish Gemological Institute (IGE) also offered free workshops covering not only gems (pearls and diamonds) but also basic gemmology and a photography workshop geared towards taking photos of gems and jewelry.

On the Saturday, Instituto Gemológico Español (IGE) held their diploma and awards ceremony.

Kudos to the organizers (Instituto Gemológico Español) and Mara Soriano (who also took the photographs). They were constantly interacting with the exhibitors and the attendees to ensure that everything went smoothly. A refreshing change to other trade shows and a very welcome surprise!















The World Gem Foundation is delighted to offer five more scholarships this year. These scholarships cover the theoretical components of our Career Gemmology Diploma Program.

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.

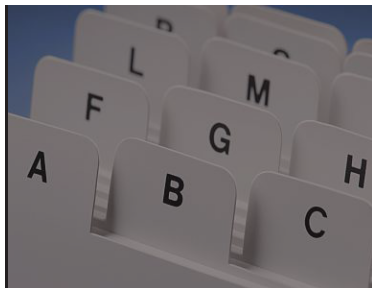
Sadly, Tino passed away in 2015 after a two-year battle with cancer, however through the Handbook of Gemmology and now the World Gem Foundation courses, his legacy and monumental contribution to our industry will live on for future generations to appreciate and admire.

In 2019, the World Gem Foundation will award five more scholarships allowing deserving students to take the World Gem Foundation theoretical 'Career Gemmology' course.

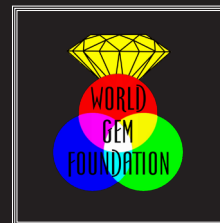
The deadline for submitting your application is December 31st, 2018. All applications will be judged by Tino's wife Petra and his oldest daughter Evelyn with the mandate to select those five candidates who, in their opinion, best epitomize the spirit of Tino.

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





Academy Directory & Contact Information



Academy Name	Website Address	E-mail Addresses
World Gem Foundation	www.worldgemfoundation.com	information@worldgemfoundation.com
American	www.americangemacademy.com	info@americangemacademy.com
British	www.britishgemacademy.com	information@britishgemacademy.com
Canadian	www.gemacademyofcanada.com	info@gemacademyofcanada.com
Caribbean	www.caribbeangemacademy.com	info@caribbeangemacademy.com
Central American	www.centralamericangemacademy.com	info@centralamericangemacademy.com
DR Congo	www.gemacademyofdrcongo.com	information@gemacademyofdrcongo.com
Dutch	www.dutchgemacademy.com	information@dutchgemacademy.com
Kenyan	www.kenyangemacademy.com	information@kenyangemacademy.com
Scandinavian	www.scandinaviangemacademy.com	info@scandinaviangemacademy.com
South American	www.southamericangemacademy.com	info@southamericangemacademy.com
Spanish	www.spanishgemacademy.com	information@spanishgemacademy.com
Indian	www.indiangemacademy.com	information@worldgemfoundation.com

World Gem Foundation

Plaça de Quadrado 1, 4B
Palma, Mallorca 07001
Spain

