

# Gemmology Today

Issue Three / 2024  
Quarterly Publication



Karma  
Karma



# FEI cui

## Rock of Ages

**G**emmologically, lapis lazuli has always held a 'unique' position in the 'gemstone kingdom'. Unlike other gems, it is actually classified as a rock, an aggregate of several different minerals including lazurite, sodalite, nosesan, haüyne, hornblende, mica, enstatite, calcite, diopside, augite, and iron pyrite.

Recent studies have shown that contrary to popular belief, the gemstone known throughout the non-Chinese world as 'jadeite' jade is also a rock composed of three major mineral components – jadeite, omphacite and kosmochlor. Since it is mineralogically incorrect to use a mineral species name to describe a rock, many have asked the all important question 'what should we call this new-found rock?'.

Many have stated that since it is revered in China and is of immense cultural significance, the term 'fei cui' pronounced 'fay choy' should be used. In fact laboratories such as Lotus Gemology have already started using this term (as of July 1st, 2023) recognizing that since the Chinese are by far the largest consumers of this material, it is appropriate to reinstate the Chinese name, a word that has existed for over a thousand years.

Etymologically, 'fei cui' means red (fei – 翡) and green (cui – 翠), from the plumage of the kingfisher bird in acknowledgement that the base material of fei cui (a pyroxene rock) is found in many different colours.

### IDENTIFICATION

In the past, it was relatively simple to separate jadeite (a pyroxene jade rock) from nephrite (an amphibole jade rock). Marked differences in their specific gravities (3.30 to 3.38 for jadeite compared to 2.90 to 3.03 for nephrite) and their refractive indices (1.652 to 1.688 for jadeite compared to 1.600 to 1.627 for nephrite) allowed even the use of basic gemmological equipment to

make the distinction. Of course, the ability to conduct these two tests often relied on (a) the item being unset and of a manageable size and (b) having a good polish and the person performing the tests to have a very good mastery of the 'Distant Vision' or 'Spot Method' for determining refractive index.

Additionally, the overall appearance of green nephrite jade, with its characteristic spinach green body colour accompanied by numerous black flecks of magnetite and graphite made it easily identifiable.

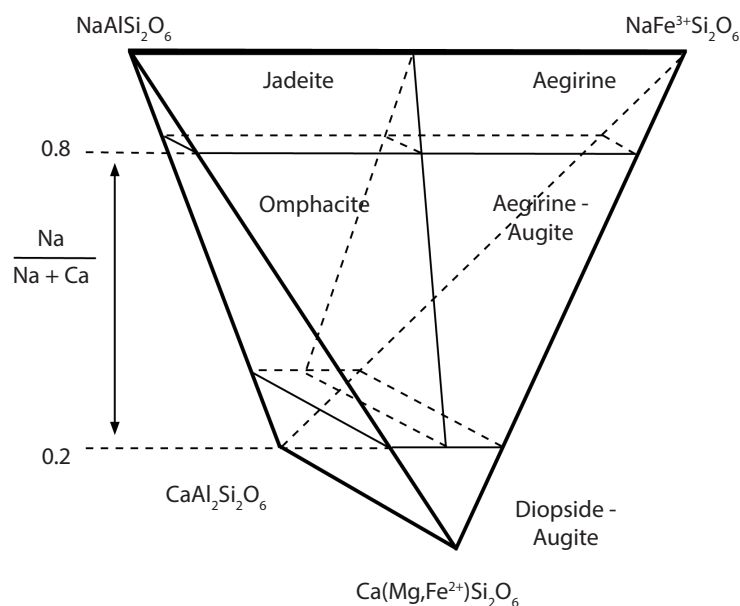
Since nephrite owes its colour to iron, it will react to an N52 magnet and in more richly coloured specimens containing small traces of chromium, a faint narrow band is sometimes visible at 689nm although it is never as distinct as the 691nm line found in jadeite jade. There are also additional lines that may be seen at 509nm, 498nm and 460nm; however, there is no absorption band at 437nm in the violet.

The discovery that many gems labelled as 'jadeite' also contain varying amounts of other clinopyroxenes (such as omphacite and kosmochlor) has complicated the situation considerably.

As with all rocks, jade is made up of an aggregate of many tiny crystals/grains; frequently these crystals/grains are made up of different minerals. This makes the accurate determination of the exact end-member percentages of a rock extremely difficult and impractical. It begs the question 'To what end should we as gemmologists attempt to do this?'

As we can see from chart below, while there are slight differences between jadeite jade, omphacite jade and kosmochlor jade in terms of their refractive indices and specific gravities, due to their complex chemical DNA, these often overlap requiring more sophisticated testing

Gemstone	R.I. Range	D.R.	Dispersion	Optical Sign	S.G. Range	Hardness
Kosmochlor Jade	1.680 - 1.750	.015	–	B–	3.35 - 3.50	5 ½ – 6
Omphacite Jade	1.660 - 1.680	.023	–	B+	3.30 - 3.45	7
Jadeite Jade	1.652 – 1.688	.020	–	B+	3.30 – 3.38	6 ½ – 7



Pyroxene Classification by Chemical Composition

Source: LMHC Standardised Gemmological Report Wording

procedures.

According to a document produced by the Gemmological Association of Hong Kong Limited entitled 'Standard Methods of Testing Fei Cui for Hong Kong', the three mineral components can be identified using their infrared spectrum fingerprints. In this document, they state '*All molecules have a unique vibrational spectrum in the infrared, which may be called its 'fingerprint'. The vibrational peaks which are used to identify the molecular structure of a material are located below ~1600 cm<sup>-1</sup>. Recording a FTIR spectrum of the members of Fei Cui in the range from 400-1600 cm<sup>-1</sup> is a direct method for identification.*'

#### Fei Cui, Jadeite Jade

The presence of peaks between 400 cm<sup>-1</sup> and 1200 cm<sup>-1</sup> at approximately 1168, 1082, 1050, 961, 850, 744, 665, 587, 530, 474 and 432 cm<sup>-1</sup> indicate the molecular vibrations of the structure of jadeite jade.

#### Fei Cui, Omphacite Jade

The presence of peaks between 400 cm<sup>-1</sup> and 1200 cm<sup>-1</sup> at approximately 1102, 1064, 957, 887, 710, 648, 563, 521, 442 and 411 cm<sup>-1</sup> indicate the molecular vibrations of the structure of omphacite.

#### Fei Cui, Kosmochlor Jade

The presence of peaks between 400 cm<sup>-1</sup> and 1200 cm<sup>-1</sup> at approximately 1153, 1063, 1035, 926, 855, 737,

651, 579, 512 and 419 cm<sup>-1</sup> indicate the molecular vibrations of the structure of kosmochlor jade.

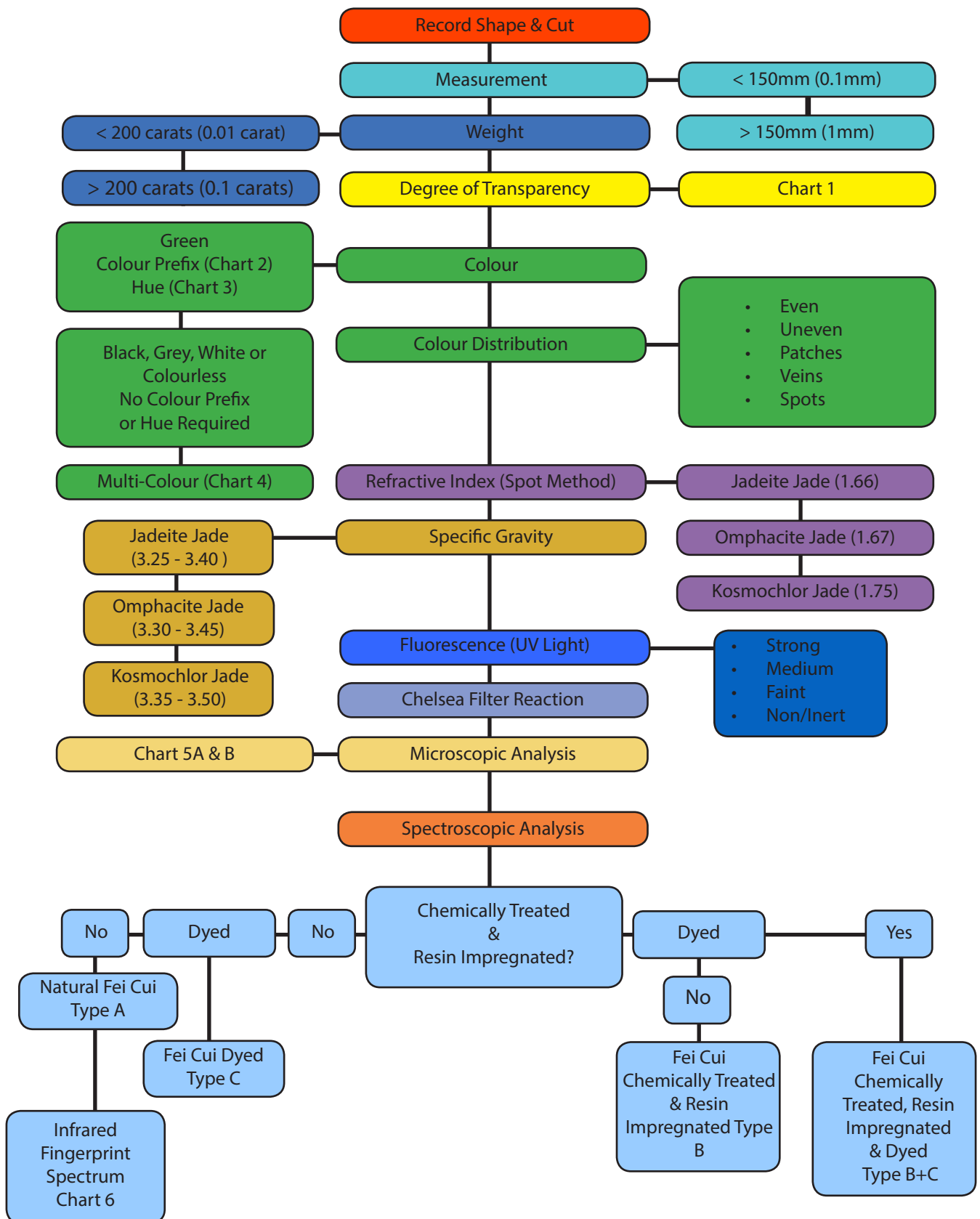
While this technology may be within the realm of established laboratories, what about everyday gemmologists using everyday gemmological equipment?

Sadly, most gemmologists do not even own a diamond screener. They deal with diamonds on a daily basis, yet they risk misidentifying lab-created diamonds because they do not see the value in making such an investment. Expecting them to equip themselves with Fourier-transform Infrared Spectroscopy (FTIR) to obtain a specular reflectance spectrum is clearly beyond any realistic expectations. Of course, it all depends on the market and your clients. Obviously if you are set up in Hong Kong, the likelihood of seeing jade on a daily basis is much higher than a similar operation set up in Seattle, Washington. Any investment has to be repaid over time. The more you use a piece of testing equipment, the more reasonable it becomes to invest in it.

#### GUIDELINES FOR GRADING FEI CUI

Guidelines set out by members of the Laboratory Manual Harmonisation Committee (LMHC) have standardised the nomenclature that can be used to describe nephrite jade, jadeite jade, omphacite jade and kosmochlor jade.

The Gemmological Association of Hong Kong (GAHK) have also issued guidelines for the identification & classification of Fei Cui jade (see next page).





## CHART 1

Degree of Transparency	Observation
Transparent	Capable of transmitting light with little or no blur-out
Translucent	Capable of transmitting and diffusing light, but an object viewed through the test 'Fei Cui' jade cannot be distinguished
Opaque	Incapable of transmitting light

## CHART 2

Colour Prefix	Saturation	Tone
Pale	Low	Light
Light	Moderate	Light
N/A	Moderate	Medium
Bright	Strong	Light to Medium
Intense	Strong	Medium to Dark
Deep	Moderate	Dark
Dark	Low	Dark

## CHART 3

Hues
Yellowish Green
Green
Bluish Green

## CHART 4

Multi-Colour Criteria	Description
Where green (or black, grey, white or colourless) is the <b>dominant colour</b> , the description of the item shall be recorded as	Green (or black, grey, white or colourless) with 'other colour'
Where green (or black, grey, white or colourless) is <b>not the dominant colour</b> , the description of the item shall be recorded as	Green (or black, grey, white or colourless) in 'other colour'
Where there is no green (or black, grey, white or colourless) colour in any portion, the description of the item shall be recorded as	Dominant colour with 'other colour'

## CHART 5A

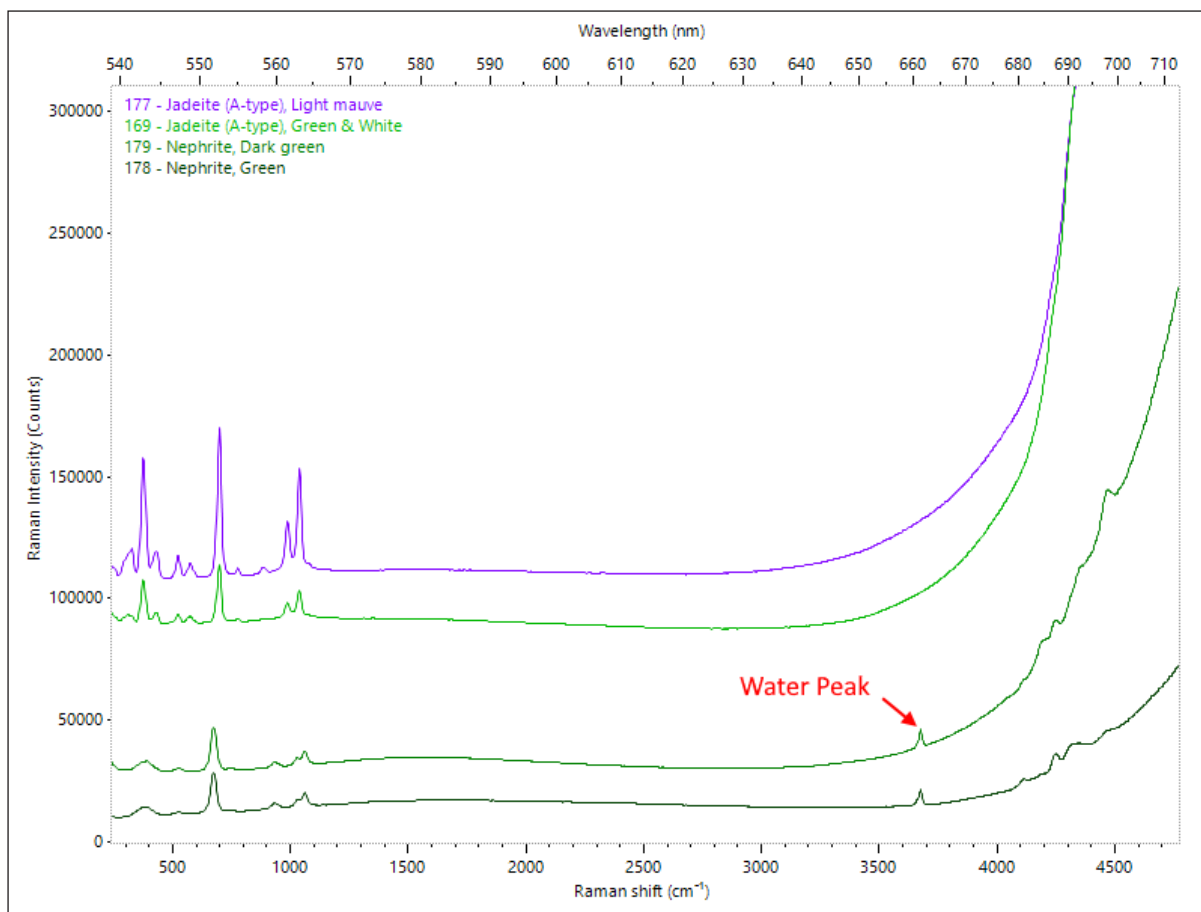
Type	Texture	Description
Very Fine Grain	Interlocking Microgranular & Microfibrinous	Difficult to see grains under loupe/ microscope (10x magnification)
Fine Grain	Interlocking Granular & Fibrous	Difficult to see grains with the naked eye; can be seen with 10x magnification
Medium Grain	Interlocking Granular & Fibrous	Visible with the naked eye (on majority part of the item)
Coarse Grain	Interlocking Granular	Very obvious grains visible with the naked eye

## CHART 5B

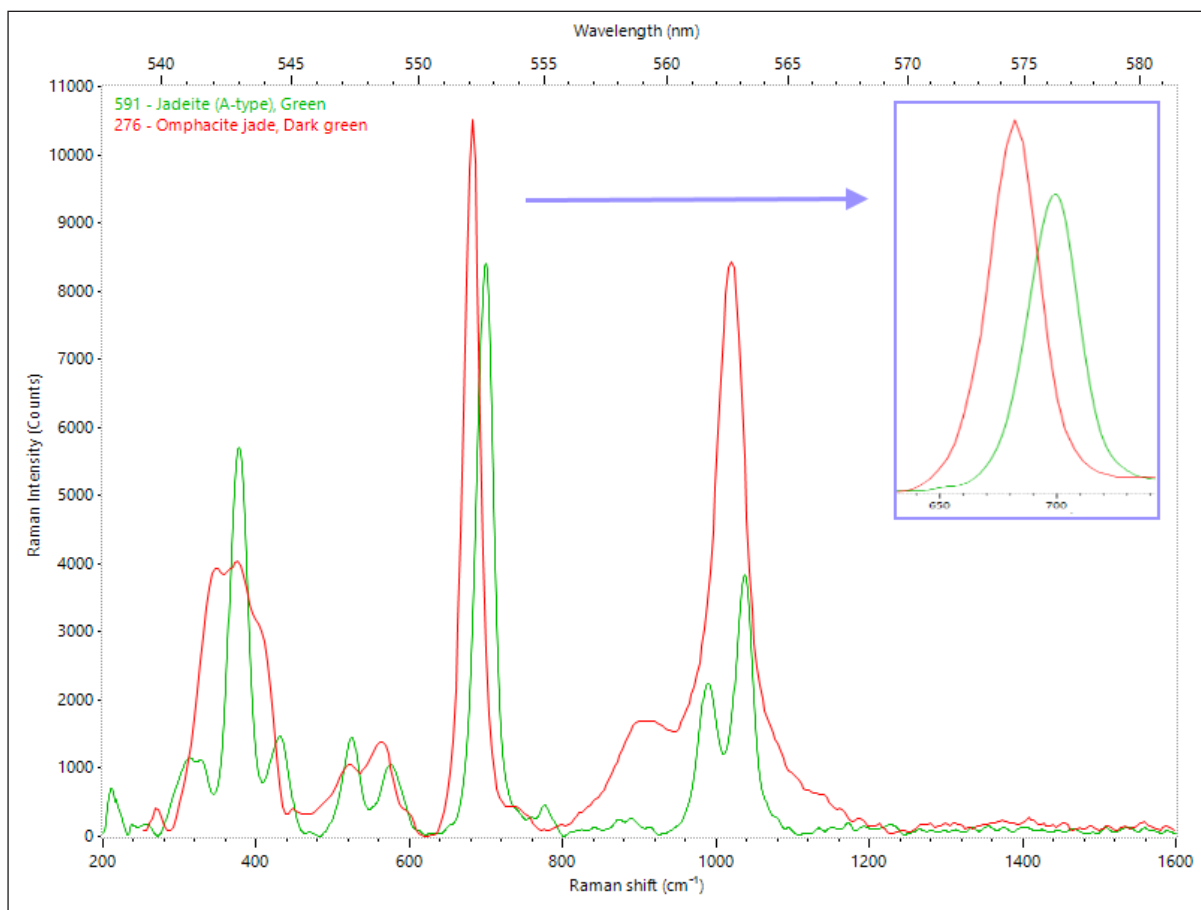
Surface			
Iron Staining	Pit	Orange Peel Effect	Groove
Glistening	Coarse Grain	Micro Crack	Interlocking Granular

## CHART 6

Variety	Fourier-transform Infrared Spectroscopy Peaks
Jadeite Jade	Peaks at approximately 1168, 1082, 1050, 961, 850, 744, 665, 587, 530, 474 and 432 cm <sup>-1</sup>
Omphacite Jade	Peaks at approximately 1102, 1064, 957, 887, 710, 648, 563, 521, 442 and 411 cm <sup>-1</sup>
Kosmochlor Jade	Peaks at approximately 1153, 1063, 1035, 926, 855, 737, 651, 579, 512 and 419 cm <sup>-1</sup>



Jadeite (Green/White & Lavender) & Nephrite (Green & Dark Green) (Courtesy of MAGILABS)



Jadeite (A Type) & Omphacite Jade (Dark Green) (Courtesy of MAGILABS)

## COMMON TREATMENTS & ENHANCEMENTS

Of particular concern in the industry is the profusion of B, C and B + C jade that has been either chemically treated and resin impregnated to enhance its transparency (B jade), dyed to enhance its colour (C jade) or both (B + C jade). Sold in a variety of colours from various shades of green to mauve/lilac, yellow, and black, these stones have been introduced to combat the increasing difficulty in obtaining gem grade 'Fei Cui' jade from Myanmar (Burma) and the substantial price increases that have been imposed over the last 50 years. It is extremely important that this treated jade is detected and disclosed.

B jade refers to lower grade jade that has been soaked in strong acids, such as hydrochloric or nitric acid, to leach out discoloured iron compounds, and then impregnated with a colourless polymer. This enhancement can be identified by noticing the colourless polymer in any surface reaching fissures. Some stones will also exhibit a superficial bluish white to yellowish green fluorescence under long wave UV light.

C jade refers to dyed jade that has not been bleached. One can expect to see under magnification concentrations of colour in the cracks and fissures, sometimes an orange-red appearance under a Chelsea filter, and broad absorption bands at 630nm and 670nm, which are different from the three vague lines at 630nm, 660nm and 690nm seen in natural green jadeite coloured by chromium.

B + C jade will show characteristics of both B and C jade. Alan Hodgkinson (and the late Dr. Bill Hanneman) both suggest that stained and natural violet jadeite should first be checked under both long wave and short-wave UV light with the former, usually fluorescing orange. However, in some cases, the stained jadeite will remain inert under UV light; these stones should then be checked under their jadeite filter to confirm whether the colour is natural. In addition, they recommend using incandescent light, such as tungsten, halogen or a penlight (not LED), instead of fluorescent, triphosphor or LED illumination when using their filter.

Nephrite breaks down at 840 degrees Celsius but has been known to be heat treated. In some cases, it is also bleached, and polymer coated to imitate 'Hetian white' nephrite or dyed to simulate more expensive nephrite.

## IDENTIFYING LAB-CREATED JADEITE

Lab-created jadeite is harder than natural 'Fei Cui' jade and tends to have a more saturated and mottled colour however there are no appreciable differences in the refractive index, the absorption spectra, fluorescence or specific gravity compared to natural jadeite. Under the Hanneman-Hodgkinson-stained green jadeite filter, lab-created green jadeite will exhibit a pinkish-

orange reaction while natural green 'Fei Cui' jade will appear green. Due to the high value of 'Fei Cui' jade, all suspected stones should however be referred to a recognized laboratory especially when dealing with samples of particularly fine quality.

## GRADING

Without question the grading and evaluation of 'Fei Cui' jade is highly complex and like opal grading requires years of experience handling stones of different colours and grades.

While the value factors vary from source to source there are seven variables that must be considered, namely:

- Colour
- Clarity
- Cracks
- Cut
- Texture
- Transparency
- Volume

## Colour

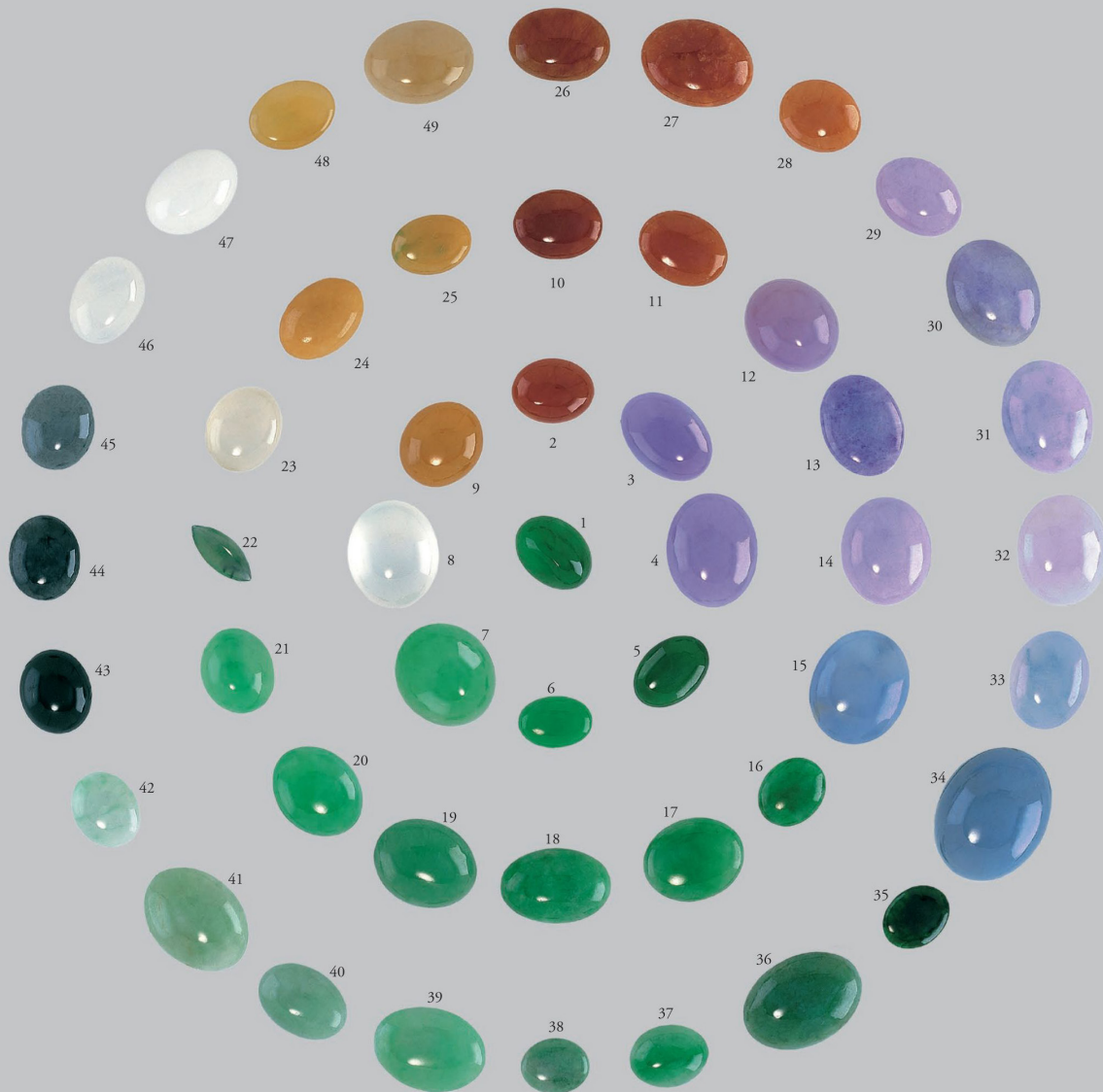
Similar to other coloured gemstones, the colour of 'Fei Cui' jade is described by three factors hue, tone and saturation (sometimes described as hue, intensity and brightness), and by a fourth factor: colour distribution. The finest green 'Fei Cui' jade will have an intense, bright pure green hue that is evenly distributed. Saturation is particularly important when grading green and lavender 'Fei Cui' jade.

In terms of value, slight yellowish or bluish secondary hues can reduce the price by up to 30% with strong yellowish or bluish secondary hues decreasing the price anywhere from between 35% and 60%. No brownish or greyish modifiers should be present.

The colour should be completely even to the unaided eye, without spotting or veins. Slightly uneven or uneven colour distribution will lower the value by up to 90%. In lower qualities, fine root or vein-like colour patterns that contrast with the body colour of the stone are considered more desirable than dull veins or roots. Mottling, dark irregular specks, or blotches that detract from the overall appearance of the stone will also reduce the value.

Mason-Kay produced a chart (see the next page) that shows the various colours of fei cui. This chart and the colours it represents was reproduced by ColourWise so that users could accurately describe the colours by hue, saturation and lightness.

# COLORS OF JADE



Translucence



Texture



**MASON - KAY**  
FINE JADE JEWELRY

(800) 722-7575 • FAX (303) 393-0201

[www.masonkay.com](http://www.masonkay.com)



Jadeite Colour Chart - Courtesy of Mason-Kay Fine Jade Jewelry



## Mason Kay

The following colour samples are based on the Mason-Kay 'Colors of Jade' Chart and includes their reference numbers (1 to 49) as well as the approximate ColourWise Colour Grades. Please note that these colour grades are based on the digital version of this chart.



Jadeite Chart - Courtesy of ColourWise

## Clarity

Inclusions will have a greater impact on high quality 'Fei Cui' jade compared to commercial grade. Similar to diamond grading, we are more concerned with the colour, degree of relief, shape, size and location of the inclusions. Typically inclusions are black, dark green, brown, or white but can also include inter-grown minerals. Significant inclusions will depreciate the stone by up to 40%.

## Cracks

Cracks can have a tremendous affect on both the durability and value of a piece of 'Fei Cui' jade. These are best observed using both transmitted and reflected light under magnification since many of these cracks will become almost invisible once the stone has been waxed. To a skilled grader, older cracks can be verified by the presence of secondary minerals found inside the cracks. Generally speaking, newly formed cracks will be more detrimental to the overall value with visible cracks affecting the value by more than 50%.

## Cut

Typically stones are cut in non-calibrated sizes with the emphasis placed on the colour, however, stones should be well-balanced, with acceptable length to width ratios and dome height. Stones that are too thin are less desirable. Polish is also of prime importance giving the stone depth and lustre. In his article *Burmese Jadeite: The Inscrutable Gem*, Richard Hughes suggests that "One method of judging the quality of polish is to examine the reflection of a beam of light on the surface of a piece of jadeite. A stone with fine polish will produce a sharp, undistorted reflection, with no 'orange-peel' or 'dimpling' visible".

## Texture

Stones that are clean to the naked eye and do not exhibit clouds, spots, veins or blotches command the higher prices. Stones are sometimes classified into three categories, fine or old mine, which is the most desirable, medium or relatively old mine and coarse or new mine. Texture should be evaluated by using both the unaided eye and 10X magnification.

## Transparency

A number of factors affect the transparency of 'Fei Cui' jade including the size of the grains, the intensity of the colour, the thickness of the piece and the presence of inclusions. For larger pieces, such as bangles, necklaces and pendants, transparency is more important than

colour, whereas in smaller pieces, such as earrings, rings and brooches, colour is more important. Opaque jade (Fei Cui) or stones with cloudy patches are the least desirable. As with the nacre thickness and the degree of lustre in pearls, high transparency will only be achieved if the piece has a very fine texture. Overall, transparency can affect the value by more than 10-fold.

## Volume

One also needs to consider the size of the rough since this will have a decided effect on the size of the finished piece. Regardless of quality, a one-kilogram piece of 'Fei Cui' jade rough will only produce up to three bangles while it can produce infinitely more cabochons. Therefore, if we are comparing two pieces of similar quality, volume will play an important part in the overall evaluation.

## Carvings

When assessing carvings, one should consider the overall design, symmetry of form, contours, details, thickness, and dimensionality. Typically, a carving will reduce the value of a high quality piece while increasing the value of a lesser quality piece. Generally speaking, carvings that are less than 3mm in thickness, show visible cracks and fissures, either internally or surface reaching, will be valued less than carvings which have good colour consistency, make good use of the material and exhibit a high degree of craftsmanship.

## Bangles

When valuing bangles, translucent, evenly coloured one piece bangles, cut from a solid piece of jade (Fei Cui) rough material are valued higher than carved bangles made from more than one piece, exhibiting fissures or cracks that are either internal or surface reaching.

## PRICING

Unfortunately, due to pricing fluctuations and the overall difficulty in researching prices, GemGuide, published by Gemworld International, no longer publishes 'Fei Cui' jade prices. For appraisers, this makes the valuation of 'Fei Cui' jade tricky and forces them to rely on wholesalers and manufacturers of 'Fei Cui' jade to substantiate prices. While in some cases this is possible, the pricing of high-quality stones is often hampered by the fact that it is difficult to find comparable stones of like kind and quality.



Green Fei Cui Necklace





Mutli-Coloured Fei Cui

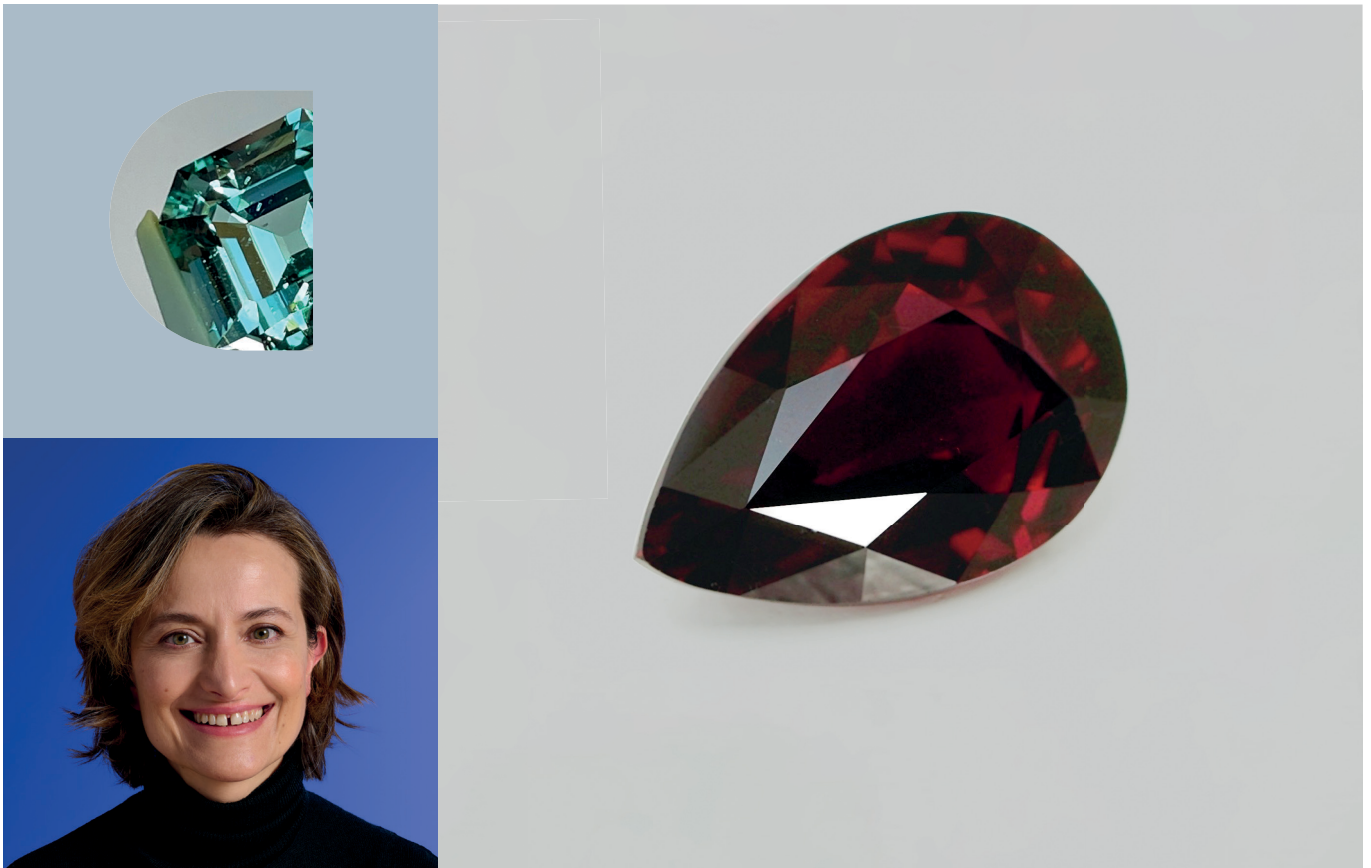


Triple Strand Green Fei Cui Necklace



# Bid on exceptional gemstones, **selected by** **Catawiki experts**

Every day, our in-house experts carefully select a wide range of gemstones from around the world for every collector.



Purificacion Aquino Garcia  
Expert Gemstones

Buy and sell on [catawiki.com](https://catawiki.com)

