Glass imitation
sold as Zultanite in Turkey

The stone shows a distinct colour change from green in daylight to brownish-pink in artificial light.

Elisabeth Strack, Gemmologisches Institut Hamburg, Germany

Since 2006 diaspore from Turkey, discovered in the late 1970s as a bye-product of prospecting for bauxite, is marketed under the trade name 'zultanite' by the American Zultanite Gems LLC company.

In May 2013, several pieces of zultanite jewellery, bought in Turkey for thousands of Euros, were submitted for identification. All centre stones, showing a striking colour change, turned out to be simple glass imitations. The photograph shows a pair of earrings in both daylight (Fig.1) and artificial light (Fig.2).


Fig. 1 Glass imitation in daylight


Fig 2 Glass imitation in artificial light

The glass imitation is made in India (sometimes sold as 'alexite', a name that should not be used, it wrongly hints at alexandrite), its colour change is produced by adding certain quantities of vanadium, chromium, manganese and iron. The refractive index is in the range of 1.55, single refractive. Swirl marks can be detected under the microscope, there is no ultra violet fluorescence. Facet junctions usually look rounded and rather blunt.

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Gemmological Qualifications of the Owner/Founder: GG
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Country: Thailand **Telephone:** +66 (0) 2 267 4325 **Fax:** +66 (0) 2 267 4327
Email: info@aigslaboratory.com **Skype:** AIGS-ICGL **Website:** aigsthailand.com
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Identification of polymer impregnated quartzite imitating B-jade and B+C-jade

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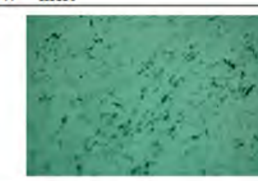
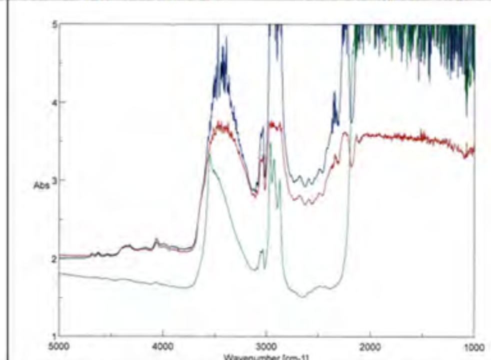
Last month, our staff went to Yangon, Myanmar for an excursion and also visited the gem trading area in Bogyoke Market (Scotts Market). While there, our staff bought some B-jade and also B+C-jade for our student study samples. It was later tested at our lab and found that the B-jade lot has been mixed with quartzite that has been polymer impregnated and another samples lot were of dyed and polymer impregnated quartzite imitating B+C-jade (Table 1). The testing results are as a follows:

Table 1. Gemological data of the dyed and polymer impregnated quartzite (1), polymer impregnated quartzite (2) and B-jade or bleached and polymer impregnated jadeite-jade (3).

Samples	1	2	3
			
Weight	41.42 cts	31.84 cts	30.84 cts
Colour	Light green	Very light grayish green	Medium-light grayish green
Carving	Donut or 'Pi'	Laughing Buddha	Laughing Buddha
R.I.	Spot 1.55	Spot 1.54	Spot 1.65
Absorption spectrum	Dyed green with absorption band at 650 – 670nm	None	Jadeite spectrum 437nm and weak absorption at 690nm
Ultraviolet light	LW – moderate chalky blue	LW – weak chalky blue	LW – weak chalky yellowish-green
	SW – weak chalky blue	SW – inert	SW – inert
Microscopic observation			
	Surface granular crystal grain structure damage caused by bleaching process (20x).	Surface granular crystal grain structure damage caused by bleaching process (20x).	Surface fibrous crystal grain structure damage caused by bleaching process (20x).
FTIR			The infrared absorption spectrum from 1,000 to 5,000 cm-1 of three treated jade and jade-like materials. The absorption spectrum in green is treated jadeite-jade or B-jade with polymer peaks at 3054, 3037, 2964, 2929, 2873cm-1(3); the absorption spectrum in brown is polymer impregnated quartzite / dyed green (1); the absorption spectrum in blue is polymer impregnated quartzite (2).
Identification	Dyed and polymer impregnated quartzite	Polymer impregnated quartzite	B-jade or bleached and polymer impregnated jadeite

Conclusions:
Traditionally, treated jade and jade-like materials are manufactured in Hong Kong and then later in China, but for the above samples that were purchased in Yangon, we suspect that these treated material may be manufactured in Burma. Gemologists or gem dealers who want to do a quick identification of these materials in a market place, one possible way is to use heft method i.e. hefting of quartz and jadeite based on their S.G. (quartz: 2.65 and jadeite: 3.34). Of course, it would good to have a refractive index reading. Heft method, although a bit difficult for beginners, it would be useful method for quick test whether it may be jadeite or quartz. The next test would be is use of loupe to look for the crystal grain structure damage caused by bleaching process and also any possible dye colour in fissures and between crystal grain structure. Our above finding confirmed the treated quartzite is one to watch out.

References: 1. Fritsch, E., Wu, S-T.T., Moses, T., McClure, S.F. and Moon, M. (1992) Identification of bleached and polymer impregnated jadeite. Gems & Gemology, 28 (3), p.176-187. **2.** OuYang, C.M. Jade ABC (Chinese edition), (1997), p130-140. **3.** Tay, T.S., Paul, S. and Puah, C.M. (1993) SEM studies of bleached and polymer-impregnated jadeite, The Australian Gemologist, Vol.18, No.8, p257-261.

Acknowledgement: Ma Gyan and Ma Swae Swae Aye for their kind assistance while in Yangon.

Infrared Reflection Spectra of Jadeite, Omphacite, Nephrite and Idocrase

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Some advanced gemmological laboratories employ infrared spectroscopy to test the resin content in jadeite. By attaching an additional IR reflection accessory, it can expand the functions of infrared spectrometer for the identification of jade and jade simulants.

The molecules of gem materials have specific absorption areas that are displayed by their infrared spectra and these areas form the fingerprint spectra of gemstones. Gemstones can be identified and confirmed through an established gemstone infra-red fingerprint database.

Some infrared spectrometer manufacturers have developed IR reflection accessory for infrared spectrometers that makes use of non-destructive technique. This IR reflection spectrum function can be used for both small and large size specimens, loose and mounted specimens (see photo 1: monkey carving of dark green Jadeite).

The name Omphacite Jade may be new to gem-mologists. In fact in China and Hong Kong it has been used as a variety of Fei Cui for more than 30 years. The chemical composition of Omphacite Jade is sodium calcium magnesium iron aluminium silicate, which is isomorphous with jadeite. The S.G. of Omphacite Jade is about 3.36 to 3.40 whereas R.I. is around 1.67 to 1.68. One interesting variety of Omphacite Jade is called Mo Cui. By reflected light, Mo Cui looks black, but under transmitted light, Mo Cui appears deep green in colour.

The following graphs are the IR reflection spectra of Jadeite, Omphacite, Nephrite and Idocrase, one can differentiate these jade stimulants easily from these spectra.

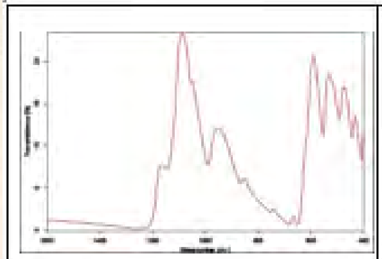

Fig 1.
IR reflection spectrum of Jadeite.

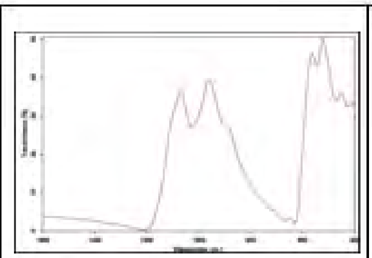

Fig 2.
IR reflection spectrum of Omphacite.

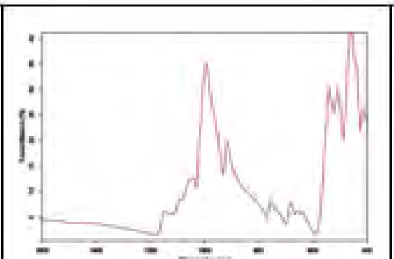

Fig 3.
IR reflection spectrum of Nephrite.

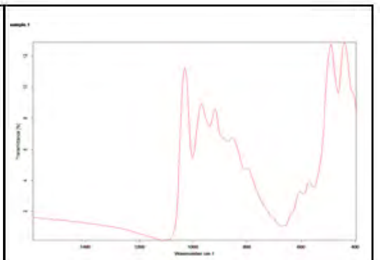

Fig 4.
IR reflection spectrum of Idocrase.

Photo 1.
Monkey carving of deep green Jadeite

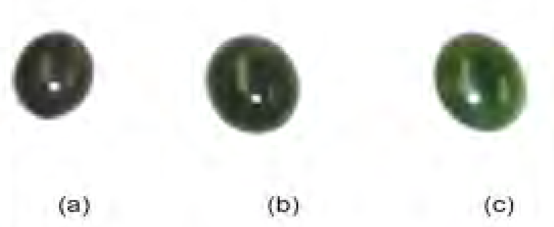

Photo 2
(a) Jadeite cabochon
(b) Nephrite cabochon
(c) Idocrase cabochon

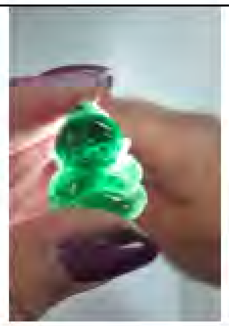

Photo 3 and 4
One interesting variety of Omphacite Jade is called Mo Cui. By reflected light, Mo Cui looks black, but under transmitted light, Mo Cui appears deep green in colour.

64th De Beers Diamond Conference, United Kingdom

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This year the 64th De Beers Diamond Conference was from Monday the 8th July to Thursday the11th July 2013. Dr. Emmanuel Fritsch gave a Keynote Presentation on the morphology of natural and synthetic diamond crystals, quoting late Prof. Ichiro Sunagawa's diagram on growth mechanism. Fritsch showed how smooth nucleation and dislocation in diamond growth are governed by some driving forces of crystallization giving rise to polyhedral, hopper, spherulitic and dendritic growth. Dr. Roger Nilen of Element Six Ltd gave a very inspiring Keynote Address on the application of polycrystalline diamond.

Dr. Faried Sallie, Head of Technology De Beers, said that they were proud to announce the invention of an automated device to detect melee sized synthetic diamonds.

From HRD, Belgium, Dr. Bert Willems spoke on the optical defects in gem quality CVD synthetic diamonds. Using a Raman microscope in high confocal mode he showed how one can observe the Raman-PL emission depth profiles which are in agreement with the presence of striations observed under the DiamondView. Ulrika D'Haenens-Johansson, GIA New York, gave a presentation on the CVD Synthetic Diamonds from Scio Diamond Technology Corporation whereas Christopher Breeding of GIA Carlsbad presented a paper on the thermoluminescence properties of natural and HPHT-treated type IaB gem diamonds.

Thomas Hainschwang of GGTL Liechtenstein deliberated on the origin of C-centre containing natural diamonds and showed how the colours other than yellow are caused by deformation related defects in combination with variable C centre content.

Jayshree Panjikar and Aatish Panjikar of PANGEMTECH, India presented two papers, one on the estimation of remnant pressure on inclusions in Indian diamond using strain birefringence. The strain birefringence in the Wajrakarur diamonds, having inclusion like spinel(Fig1), was in the range of 0.0048 to 0.0190. Where as in the case of Majhgawan diamonds, (mostly Type IaA and Type IaAB) having inclusion of olivine (Fig 2), the strain birefringence is in the range of 0.0038 to 0.0076. Preliminary studies indicate the inclusions caused maximum strain birefringence in the range of 0.0038 to 0.0190 with internal pressure estimated to be in the range of 6.55 to 32.75kbar (0.6 to 3.2GPa).There is a relationship between remnant pressure in the inclusion and resultant strain birefringence in the diamond and one can calculate the remnant pressure directly from a chart (Fig 3) provided by Barron et al (2008).

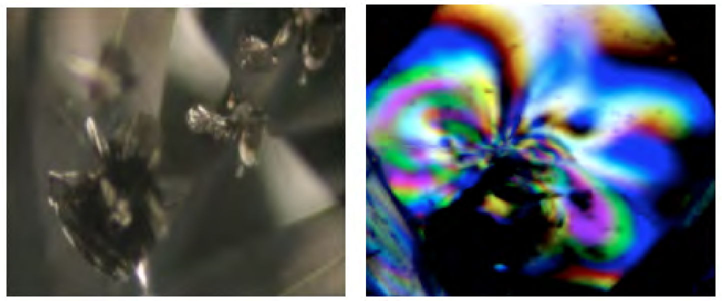

Fig 1.Spinel inclusion in Wajrakarur diamond and its strain

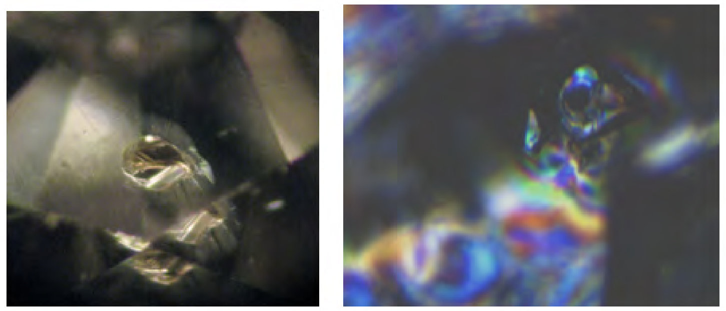

Fig 2.Olivine inclusion in Majhgawan diamond and its strain

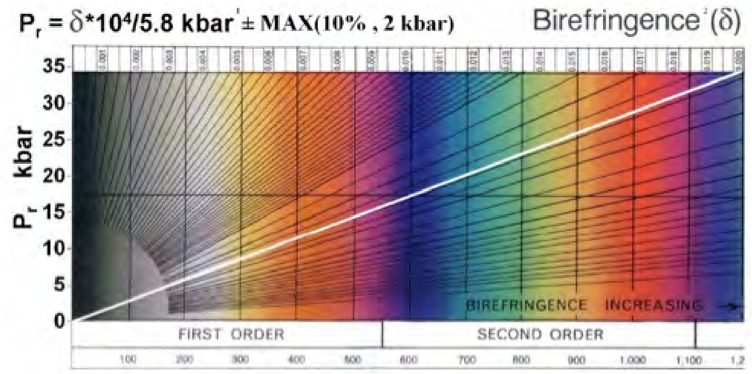

Fig 3 Pressure Vs Strain Birefringence Chart - After Barron et al (2008)

Another paper was presented by Panjikar in association with Ms. Rupali Deshpande of NVIDIA India on the application of GPU in visualizing diamond inclusions showing how graphics processing units (GPU) and CUDA based reconstruction can render transparent and opaque pinpoint inclusions. These inclusions can be precisely mapped with a magnification of 115X with on screen zoom of 530X and resolution of 0.0009mm/pixel. This would help in distinguishing natural diamonds from HPHT synthetic diamond having very fine metallic dust like inclusions.

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