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INTERNATIONAL CONSORTIUM OF GEM TESTING LABORATORIES

By John Richoz
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The International Consortium of Gemological Laboratories (ICGL) held its first meeting on December 11th, 2012, at Kowloon Restaurant, Holiday Inn Hotel, located on Silom Road in Bangkok. The idea, first conceived by Dr. Jayshree Panjikar and Mr. Henry Ho, was to unite independent laboratories around the world, in order to share and exchange knowledge and experience. In doing so, the ICGL aims at providing each laboratory an access to a pool of experts, as well as a common platform to communicate for the betterment and advancement of its members.

The Founding Members of ICGL include Dr. Jayshree Panjikar (PANGEMTECH), Mr. Henry Ho (ASIAN INSTITUTE OF GEMOLOGICAL SCIENCE), Mr. Tay Thye Sun (FAR EAST GEMLAB), Mr. Branko Deljanin (CANADIAN GEMOLOGICAL LABORATORY), Ms. Elisabeth Strack (GEMOLOGICAL INSTITUTE HAMBURG), Mr. Masaki Furuya (JAPAN GERMANY GEMMOLOGICAL LABORATORY), and Mr. Dominic Mok (ASIAN GEMOLOGICAL INSTITUTE AND LABORATORY). More members are expected to be invited to participate to the consortium, up to approximately 30 laboratories. In addition, different categories of membership will be determined by the board of directors. They will likely range from Founding Members (this class will regroup the only persons who initiated the project and assumed its financing costs), Regular Members, Corporate Members, and possibly Honorary and Associate Members, these details still to be discussed between the founding members.

A data center is expected to be set up to archive articles and lab data, such as the origins of gemstones. The latest information on gem treatments, advanced lab testing techniques, mines, general educational and training, diamond treatments are among the many topics that have been mentioned as part of the objectives of this initiative.

The purpose of ICGL is to promote excellence in the field of gemology, and to reach out the final customer by providing reliable sources as an alternative to the plethora of misleading information available today, in particular on the internet. Besides, the affiliation plans to undertake joint research projects, including the publication of documents and articles, and other relevant laboratory activities.

Through this project, ICGL aims at welcoming professionals of gemology, coming from all quarters of the world, who share similar vision and ethical values to gather together for common causes such as science gemology, exchange information on diamond, color stones, pearls, and promote a common language to the benefits of our customers in order to facilitate fair trade in the gem and jewelry industry.

SCREENING AND IDENTIFICATION OF DIAMONDS FOR THE SYNTHETIC ORIGIN USING THE UV LAMP AND THE POLARIOSCOPE MOUNTED ON A MICROSCOPE

By Branko Deljanin, B.Sc., GG, FGA, DUG

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Background

More than 600 undisclosed synthetic diamonds less than 1.00 carat came to Antwerp and Hong Kong laboratories for certification in 2012. This article is written after presentation at GIT Conference 2012 in Bangkok with the aim to help dealers, gemmologists and appraisers screen and identify synthetic diamonds grown by the HPHT and CVD method. The goal is to identify different types of natural diamonds and synthetic diamonds smaller than 1.00 carat using only standard instruments (i.e. U.V. lamp and polariscope mounted on microscope). It is important to know the corelation of diamond types to synthetic diamonds in order to know when to send such stones to a gem laboratory for further testing of the origin (natural, treated or synthetic).

Diamonds, either natural, treated or synthetic are classified into four basic types (Ia, IIa, Ib, IIb) according to the relative presence of nitrogen (N) and boron (B) impurities.
Most natural diamonds contain pairs of nitrogen and are classified as type Ia while coloured HPHT-grown diamonds contain a single nitrogen (type Ib) or boron (type IIb) element, and CVD-grown diamonds do not have impurities (type IIa) (see figure 1).

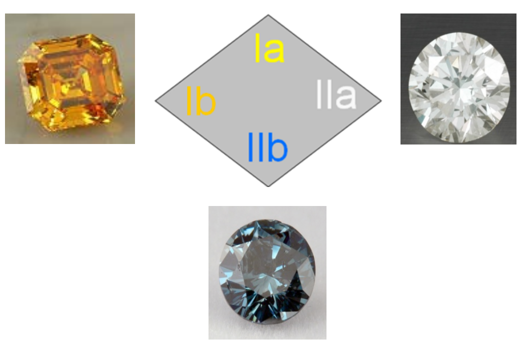

Figure 1: Synthetic diamonds grown in a laboratory by using HPHT or CVD could be yellow (type Ib (left)), blue (type IIb (middle)) or colorless (type IIa (right)), like these images obtained from The Advanced Optical Technology of Canada.

Most natural diamonds are type Ia (over 97%) and in very rare occasions HPHT-grown diamonds are mixture Ia and Ib.

Fluorescence

Fluorescence is luminescence that is mostly found as an optical phenomenon in diamonds, in which the molecular absorption of photons, when exposed to UV light, triggers the emission of visible light (usually blue in 95% of diamonds). Most natural diamonds react stronger at long wave UV and usually weaker (mostly blue) at shorter wavelengths.

Most **synthetic diamonds** have a stronger reaction to SW light than to LW light, or do not show any fluorescence (see figure 2).

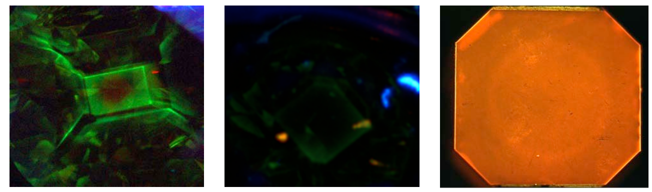

Figure 2: A "Cubic" pattern under SW UV light is easy to see in a 0.90 ct diamond under the UV lamp (left) but if the UV lamp is mounted on a microscope a similar pattern would identify that this mounted 0.02ct diamond is synthetic (middle). Strong orange fluorescence under SW light would identify this diamond as CVD-grown, not post-treated (right)).

Visual presentation of diamonds under cross polarized filters

The Polariscope uses two polarizing filters (a polarizer and an analyzer) oriented at right angles to each other ("crossed position"), and the diamond to be tested is sitting between the two filters.
When a portable polarioscope is placed a under microscope, even small and melee diamonds can be checked for presence (indicating natural diamond) or absence of the pattern (identified HPHT grown or new generation of CVD grown diamonds). CVD grown diamonds grown by Apollo show a "columnar structure" under cross-polarized filters (see figure 3), but the new generation of CVD-grown diamonds (Gemesis) have either a very weak pattern or absence of pattern.

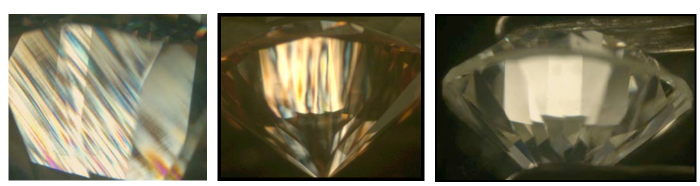

Figure 3: Type IIa natural diamond with "tatami" pattern (left), Apollo CVD-grown diamond with "columnar" pattern perpendicular to the table which reveal directions of crystal growth (middle) and a HPHT-grown diamond without the birefringence pattern (right) proving synthetic origin.

Discussion

It is not practical to send all diamonds, especially under 0.50 ct to labs for identification reports. We recommend a UV lamp for screening synthetic diamonds and cross-polarized filters (especially mounted on a microscope) for positive identification of these stones as "lab-grown".

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IDENTIFICATION OF NATURAL, TREATED, SYNTHETIC AND TREATED-SYNTHETIC YELLOW SAPPHIRE BY FEATHER TYPE INCLUSIONS

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The natural yellow sapphires have a wide variety of internal features indicative of their natural origin: silk, feathers, various patterns of healed feathers, feathers around crystalline inclusions, feathers made of crystalline inclusions, feathers with liquid films, feathers with two phase inclusions, and growth structures.

Treated yellow sapphires reveal several diagnostic internal features. Most notably, these consist of distinctive "expanded feathers" as well as "beaded feathers". The beryllium treated yellow sapphires contain disc shaped feathers. Some have thick bulbous type flux feathers. Synthetic samples and synthetic treated samples have some very specific inclusions, besides flux feathers, twisted feathers, wispy-feathers, some of the flux feathers contained groups of pinpoint inclusions. Treated synthetic yellow sapphires have remnants of gas bubbles that are indicative of the artificial growth process.

Natural yellow sapphires have characteristic feather-like or fingerprint inclusions, which are defined as follows:

(1) feathers made up of very fine acicular liquid droplets, (2) crystals embedded in feathers, (3) feathers with liquid film present along side, (4) feathers that have interconnecting channels and, (5) another type feathers with negative crystals, (6) Multiple feathers with crystal, (7) healed feathers with angular expansions.

Treated yellow sapphires have: (8) expanded feather, typical (9) beaded feathers due to borax, (10) bulbous type feathers, and (11) flux feathers. It was observed the beryllium treated yellow sapphires often showed, due to high temperatures involved, (12) disc shaped decrepitation-feathers around central crystal, and (13) fern shaped re-crystallization of inclusions in feathers. In the treated synthetic yellow sapphires one can notice the (14) twisted feathers, and (15) induced flux feathers. Apart from these there are 3 other types of feathers which are common for treated and synthetic treated yellow sapphires.

Internal features (with magnification) especially the varied feather-type inclusions play an important role as useful diagnostic indicators for gemmologists with basic equipment.

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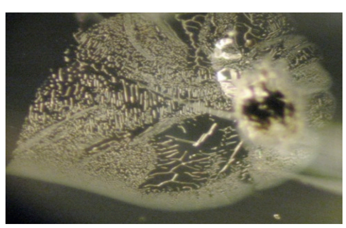
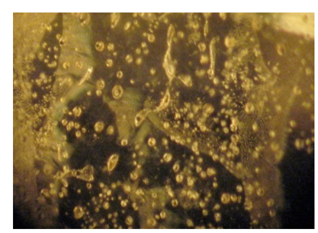
Natural Yellow Sapphire



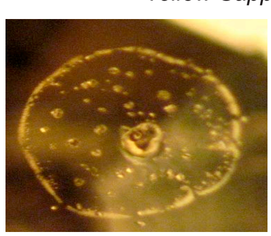
Feathers Seen in Natural Yellow Sapphire

Borax Treated Yellow Sapphire



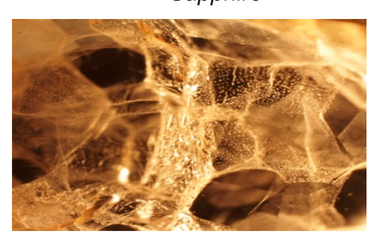
Feathers in Treated Yellow Sapphire

Be- Treated Yellow Sapphire



Feathers in Be- Treated Yellow Sapphire

Treated Synthetic Yellow Sapphire



Feathers in Treated Synthetic Yellow Sapphire

TRADING OF JADEITE-JADE IN MANDALAY, MYANMAR

By Tay Thye Sun & Tay Kun Ming

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Mandalay jade market is a fascinating place for jade collectors, jade dealers and gemologists. The jade market is full of jade of many kinds, natural to treated including dyed colours, rough to polished cabochon materials, and imitations too. The market is situated between 42/41 and 88/87 street and trading starts in the morning at about 8am and finishes just before noon time. Rough jade can be found along the sides of the streets (Fig. 1) and semi-cut ones within the market place. Large quantities of commercial quality cabochon of any size (Fig. 2), all colours and quality and also jade bangle (Fig. 3) are available. For better quality jadeite materials, one usually needs an appointment with larger jade dealers. Otherwise, if one is interested in just commercial to medium quality, Mandalay jade market has everything to offer.

Figure 1: Jade rough on display on the floor just outside the market place (Tay, 2011)

Figure 2: Assortment of jadeite-jade cabochon of many colours and quality on display (Tay, 2011)

Figure 3: Jade bangle of various sizes, but watch out for the light surface dyed material

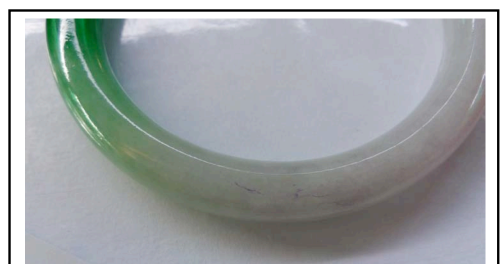

Figure 4: Dyed lavender colour could be seen in this green / lavender jade bangle where lavender colour is appeared very fine in between fissures or cracks and some time between crystal grain boundary

Our Mogok gem dealers warned us that when buying jade in the Mandalay market one has to be very careful as recently superficial dyed green and lavender jade bangles are plentiful. Our suspicion was confirmed. Not just the lower quality material, but medium quality material were dyed too. The combination of green and lavender makes it look nice and saleable. Dyed could be seen with naked eye, but some dyed were very fine i.e. very fine dyed in between crystal grains structure or in fine fissures (Fig. 4). Asked the dealers why dyed jade bangles? He said it is a common practice and otherwise it is hard to sell. The dealers even claimed he could wash it away using detergent but of course, since it is dyed, there is no point going further. We learned a good lesson.

Acknowledgement: Thanks to Ma Gyan and Ngi Ngi Aung for the good advice.

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