CIGem News (January/February 2009)

The Bimonthly Newsletter of the Canadian Institute of Gemmology (C.I.G.)

Tucson 2009 and Outlook for Gemmologists

Every year in February Tucson, Arizona becomes the Mecca of everyone involved in the gem and jewellery industry. Due to the difficult economic times the outlook for Tucson 09 will not be favorable. Perhaps for the first time in years buyers will find hotel rooms at more decent rates and sellers competing for your dollars.

There are many challenges: Industry groups and their leaders need to work on awareness building with respect to demands by consumers for more transparency and disclosure of gem treatments. Silence is not the answer!

The practicing gemmologist can play an important role in this process by learning more about these treatments and by educating the general public. The jewellery industry is in need of competent professionals and I can see a great potential for employment opportunities at all levels of our industry in the future. An educated consumer deserves an ethical and trained professional.

Treated Tourmaline

The discussion about possible treatments of tourmaline has flared up again. Bangkok dealers offer very attractive pink tourmaline at lower prices than ever before. Usually they list heat treatment as an "acceptable trade practice" - a statement I strongly resent. It all started when "geuda" sapphires from Sri Lanka were turned from worthless material into a man-made blue sapphire of acceptable colour. Today these sapphires are mostly sold undisclosed and have depressed the prices for untreated sapphire for the last 30 years. This is a totally unacceptable practice and very damaging for the whole of the gem industry.

A recent study by the ISG (International School of Gemmology) on pink tourmaline contains revealing empirical evidence based on advanced scientific study and statistical data and how to possibly spot the "Bangkok" tourmalines; read here.

This brings us back to the question: is heavy metal bulk diffusion in tourmaline and other gemstones possible? Personally I believe that it is being done and eventually we will find out how it is done.

For the mysterious red andesine we first heard that metal diffusion was impossible until Dr. Emmett bulk diffused copper into labradorite. For tourmaline it is being doubted due to the time needed and by the size of the vacancies necessary if atomic diffusion took place via direct exchange or ring mechanism.

Reflecting on my almost forgotten 2-year background of university physics I did some research about diffusion theories. I came across the name Kirkendall and his discovery (read The

Discovery and Acceptance of the Kirkendall Effect) which was discredited for a long time; it is based on diffusion phenomenas of gold in solid lead going back to 1896. A closer look at his theory may widen the perspective of potential diffusion mechanisms as applied to gems and minerals.

Tourmalines may occur in a variety of metamorphic assemblages and IMHO does not form the solid monocrystalline material as many assume. In this context past and on-going work for tourmaline synthesis are of interest. Numerous papers can be found by searching the internet.

In the Kirkendall Effect vacany diffusion occurs and has been demonstrated in a laminate of copper and nickel after heat treatment. The copper actually diffuses faster in the nickel and this "goes against intuition because copper has a lower melting temperature than nickel" (Bhadeshia); read article The Kirkendall Effect.

I believe that irradiation has the potential to create larger vacancy concentrations in tourmaline than many are willing to accept. Speculating on all of the above it is quite possible that the "Bangkok cookers" have found a way to accomplish this task. Perhaps I can find more evidence during my next visit to Chanthaburi and Bangkok in March.

JUST IN: David Federman's article in Colored Stone magazine: A Dark Hour for Gemology: The Diffusion Debacle and a further report by Robert James (International School of Gemmology) on grain boundary diffusion; read here. GIA Reports: Pink Color Around Growth Tubes in Copper-Bearing Tourmalines Results from Natural Irradiation. See Lab Alert and Response in National Jeweler by Joseph I Swezda. UPDATED!

PS: Regarding the mysterious Andesine/Labradorite I am still waiting for someone producing and describing a larger quantity of facet grade and untreated material coming from an independently verified location.

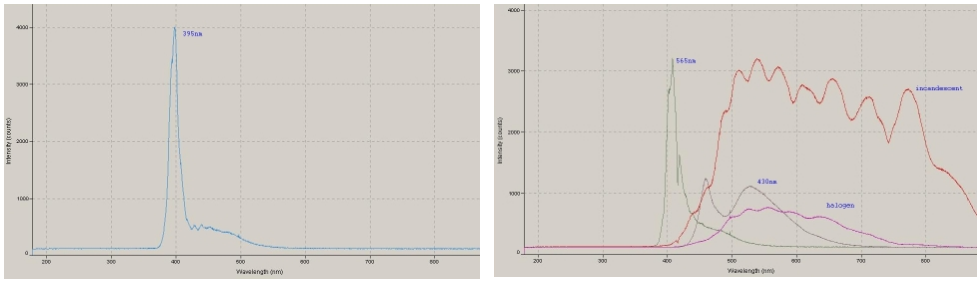
Blue Diamond

We have an attractive .19ct blue diamond (clarity grade VS) in our gem study collection. It has been there for the last 15 - 20 years and not until recently I conducted some tests to see whether it was a natural blue diamond. All natural blue diamonds are supposed to be type IIb and electrically conductive. A test with the moissanite tester (the instrument checks for electric conductivity) quickly eliminated this possibility leaving us with three options: cyclotron treated diamond, synthetic diamond or synthetic treated diamond.

To my knowledge HPHT treatments were uncommon until the late 1990s and treated diamonds (GE POL) usually marketed by General Electric. While commercially available synthetic diamonds of Russian origin have been known since 1992 gem quality synthetic type IIb blue diamonds were first reported by Smith and Bosshart (1999); read here.

A cyclotroned diamond (Nassau 1984) has a "skin deep" colour distribution causing a halo around the girdle of table-treated diamonds or an "umbrella" around the girdle in culet treated diamonds (we have a sample of yellow diamond displaying this "Chinese umbrella" effect), the presence of 594nm line and absence of electro-conductivity. Our diamond did not have any magnetic property, did not show any detectable 594nm line and at first sight did not show any halo or umbrella effect. It had a weak reaction to SW and moderate fluorescence to LW under a mercury UV lamp; no phosphorescence was noted.

For further fluorescence testing I not only used the UV 395nm LED like on two synthetic yellow diamonds (as reported in the December 2008 CIGem News) but a whole array of other LED and tungsten/halogen illuminants. They showed very interesting minor to very dramatic emission shifts reminding of newer synthetic fancy coloured diamonds. However, there are no data for comparison available to help in the identification.



On the left small emission shift under UV 395nm; on the right using various light sources as indicated.

The newer lab-grown diamonds are usually identified under the microscope by looking for metallic inclusions or using CPF (Crossed Polarizing Filters) for the cubo-octrahedral growth structure. After attaching the polariscope to the microscope I observed (under crossed polarizers) a small sheen but nothing unusual. However, when I looked at the diamond from the side while resting on the bottom polar (single plane polarized) I saw something which looked like a doublet: the crown was entirely coloured blue and the pavilion colourless.

In conclusion I am pretty confident that our blue diamond is a table-treated cyclotroned diamond of the 1980s.

Canadian Institute of Gemmology

The following class-room courses held at 555 Seymour Street, Vancouver will be available soon:

Introduction to Pearls, Opal and Jade - Register by March 13 - More info here

Course 160-1 Fri, March 27, 6:15 - 9:00 p.m., Sat/Sun, March 28/29, 10 a.m - 4:30 p.m. (weekend class, Vancouver)

- $495 includes text-book and exam fee (no GST), study materials with binder will be shipped upon registration

For "Introduction to Gemmology" program, "Diamond Expert (C.I.G.)" and "Fine Jewellery Expert (C.I.G.)" certificate programs go to C.I.G.'s website

We have reduced the price for several books to clear our inventory. Go to Specials or visit gemlab

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