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**FOR IMMEDIATE RELEASE**

# Cobalt-Colored Composite Sapphires Now Entering the Market

**28 January 2013: NEW YORK** – American Gemological Laboratories (AGL): Gemstone treatments are a regular issue which the gemstone trade has to contend with. In May 2012, AGL first learned of a new type of treated sapphire which was becoming available in the Bangkok market "This treatment was first described to me as a new type of lead-glass treated corundum where a blue colorant was also introduced." indicated Christopher P. Smith, President of AGL.

In November and December of 2012, clients of the AGL contacted the lab indicating that such stones were starting to be encountered in the marketplace.

Recently a couple of samples were sent to the AGL by Dr. Cigdem Lule of GemWorld International Inc. Although the stones appeared fairly transparent and had a convincing "blue sapphire" color, color concentrations were readily visible upon closer scrutiny even with the unaided eye and were obvious with magnification using a 10x loupe or microscope (figure 1 below).

"A chemical analysis readily showed a high concentration of lead in addition to the aluminum oxide of corundum, with trace elements of iron and gallium, while a visible spectrum revealed absorption bands associated with cobalt." Smith stated (figure 2 below).

It is clear that this most recent treatment is an extension of the lead-glass treated rubies, also known as Composite Ruby, which have been entering the market in large numbers since 2003. These new lead-glass treated sapphires are consistent with Composite Rubies regarding a number of key issues: The host corundum is very low grade and a significant portion of the stone is composed of a high lead-content glass that is filling innumerable fractures, broad seams, parting planes and cavities (figure 3 below). The glass is vulnerable to a wide range of acids, household products and standard bench jeweler practices, which will etch the glass, damaging the appearance and potential durability of the stone. As a result, the AGL will be classifying these stones as Composite Sapphire (for an example of an AGL report on a Composite Sapphire, please see www.aglgemlab.com/news/Composite Sapphire report).

However, these heavily treated stones do vary in some ways from the original lead-glass treated Composite Rubies. "Primarily, cobalt has been added to the chemical composition of the lead-glass to infuse an intense blue coloration in these stones." Smith stated "The lead-glass used to treat ruby rough had a golden color. When that particular composition of lead-glass was used to treat low-grade blue sapphire rough though, the resulting color of the stone was dingy and unattractive. The blue color induced with cobalt added to the lead-glass in the present stones is more attractive and similar to the appearance of a typical blue sapphire color."

The artificially-induced blue coloration in these stones is readily apparent however the obvious flash-effect that is typical of a Composite Ruby is not as evident. Other key identifying features consists of numerous contraction bubbles and irregular black, reflective particles visible throughout the interior of these stones (figure 4 below).

Smith concluded by stating "It is unclear at present how much of this material may be entering the market however these Composite Sapphires should not pose a problem since they are readily identifiable and distinguishable from both unheated and heated natural sapphires for any gemologist, jeweler or appraiser using simple magnification or an absorption spectrum."

**Background**

In 2003, a lead-glass treatment of ruby/corundum began flooding the international gemstone market. This product was later classified as "Composite Ruby" by the AGL (*AGL modifies its disclosure policy on lead-glass filled rubies: November 2007*). The lead-glass utilized in this treatment dramatically improves the transparency, as well as the color of low-grade ruby/corundum rough.

In 2007, a cobalt-colored and lead-glass treatment of low-grade corundum was first seen, however, at that time these stones remained essentially opaque and they displayed an overly dark blue color. This latest cobalt-colored lead-glass treatment has improved upon the prior treatment by decreasing the saturation of the blue color and significantly increasing the transparency of the resulting Composite Sapphire (figure 5 below).

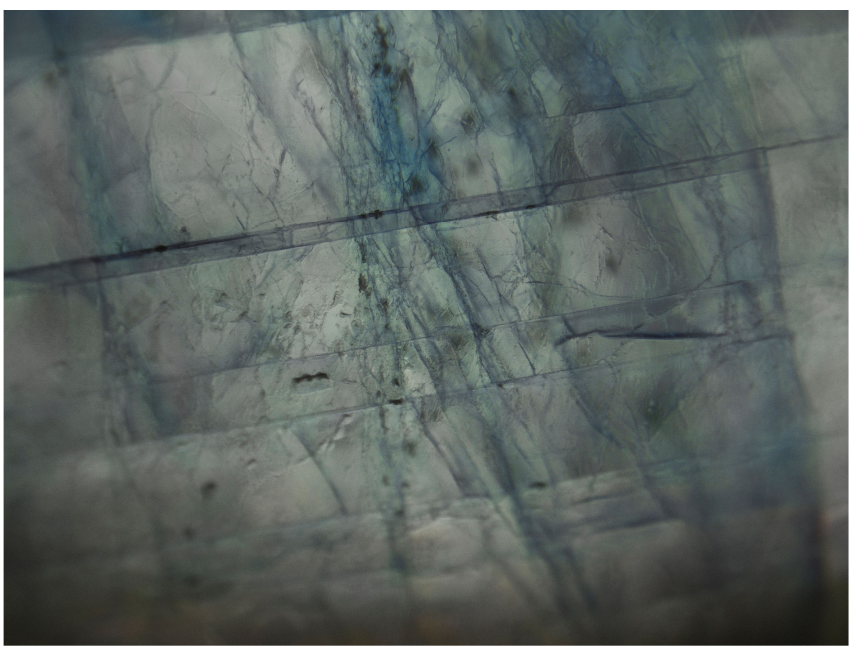

Figure 1: The blue coloration of the lead-glass was readily visible along fractures, broad seams and parting planes throughout these stones. Photomicrograph by Christopher P. Smith, 40x.

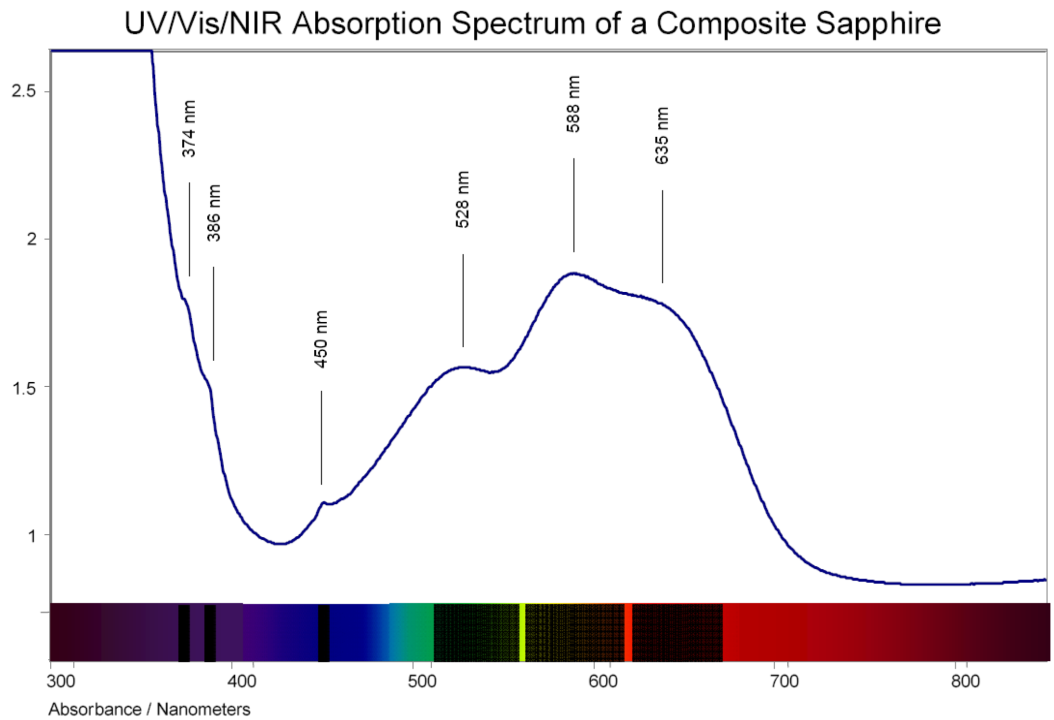


Figure 2: Energy dispersive X-ray fluorescence spectroscopy (ED-XRF) revealed the high lead content present in these stones, while the visible absorption spectrum proved that the blue coloration was due to cobalt. Such cobalt-related absorption bands do not occur in sapphire naturally. The weak bands present at 450, 386 and 374 nm are due to iron ($Fe^{3+}$) present in the corundum.

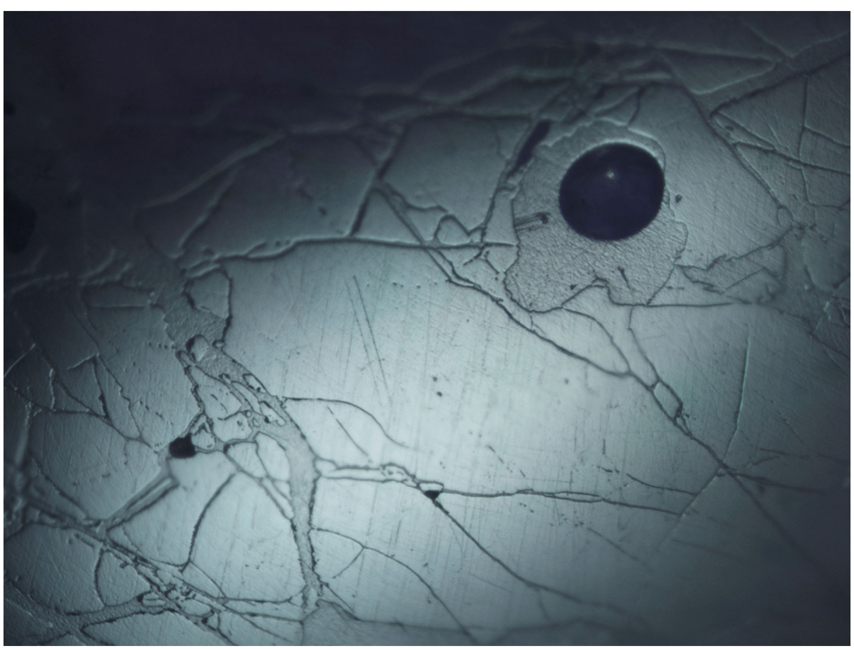

Figure 3: With overhead, reflected light the surface of these stones were seen to be traversed by an extensive network of fractures, broad seams, parting planes and cavities that were filled with a high lead-content glass which is very close in refractive index to the host corundum. Photomicrograph by Christopher P. Smith, 75x.

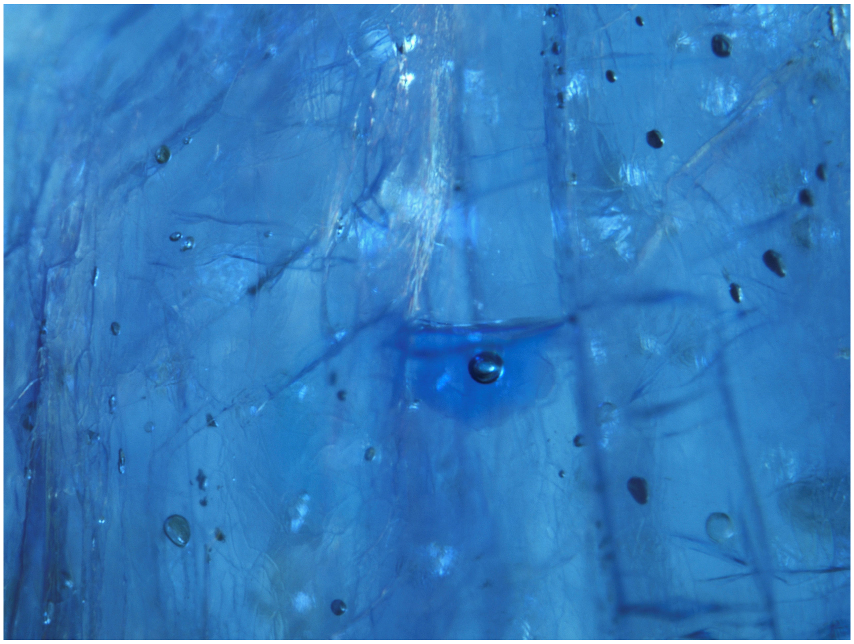

Figure 4: Populating the interior of these Composite Sapphires are numerous contraction bubbles and irregular black, reflective particles. Also note the “pool” of blue colored glass surrounding the largest contraction bubble. Other inclusions related to the host corundum were also evident but are not seen in this image. These included small crystals of foreign minerals, with fine rutile needles and pinpoint particles, indicating that only relatively low-temperature heat is involved with this treatment process. Photomicrograph by Christopher P. Smith, 68x.

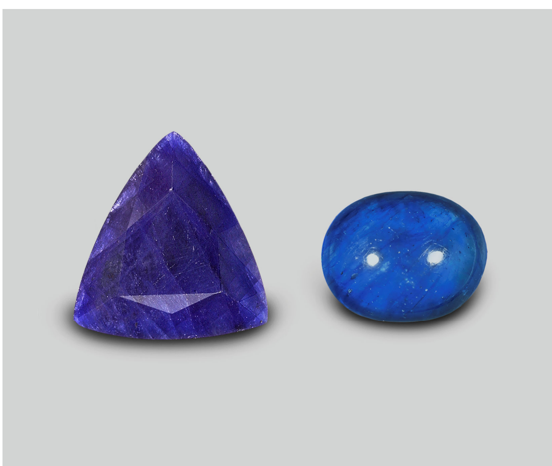

Figure 5: These two stones were treated with a cobalt-colored lead-glass. The triangular stone was acquired in 2007 and represents an early generation of this treatment. These early-generation treated stones remained opaque and the color tended to be overly dark. The present generation of this treatment significantly improves the transparency of the low-grade sapphire/corundum rough and induces a more “natural-appearing” sapphire blue color. Photograph by Jeremy Powitz and Bilal Mahmood, American Gemological Laboratories.

References:
http://www.git.or.th/eng/testing_center_en/lab_notes_en/glab_en/2012/Cobalt_Lead_Glass_FF_Sapphire_Final.pdf

http://www.gaaj-zenhokyo.easystockhosting.com/treatment-blue-sapphire-super-diffusion-tanusorn-filling-treatment-cobalt-coloured-lead-glass

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American Gemological Laboratories (AGL) is the United States' most widely known and respected colored stone gem identification and quality grading laboratory. It was founded in 1977 and became the first gemological laboratory in the US to provide quality grading as well as country-of-origin determinations for colored stones. AGL has become an iconic brand for uncompromised standards and excellence in gemstone reporting and is regularly featured by the auction houses of Christie's and Sotheby's for important colored stones they are offering for sale.

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