



The Gem and Jewelry Institute of Thailand (Public Organization)

URGENT LAB INFO

“RECONSTRUCTED SAPPHIRE: A NEW TYPE OF MANMADE GEM CORUNDUM”

By Gem Testing Laboratory
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INTRODUCTION

Recently, GIT-GTL received two weird dark blue stones weighing 5.13 and 6.53 ct in mixed cut oval shapes for identification (Figure 1). These two stones were claimed by the client to be a new type of treated blue sapphire without any further details.

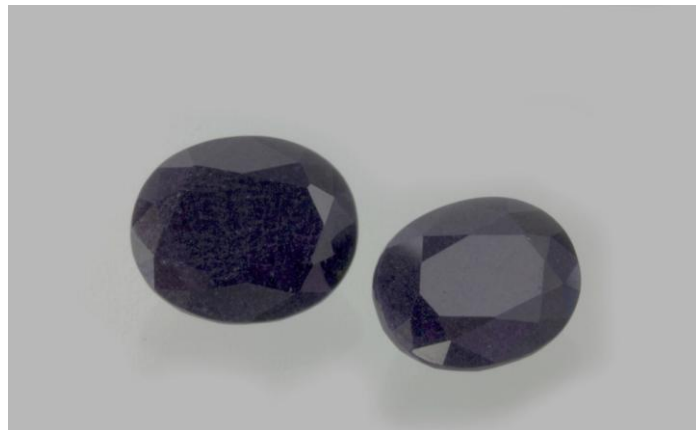


Figure 1: Two dark blue stones weighing 5.13 ct (right) and 6.53 ct (left) submitted to the GIT-GTL for testing. (photo: Warinthip K.)

GEMOLOGICAL PROPERTIES

Microscopic observation reveals very unusual features of this corundum. The stones show obviously granular texture comprising dull whitish angular grains varying in size from approximately 0.1 to 0.4 mm (Figure 2). Those grains are cemented by dark blue matrix containing many small gas bubbles. The stones show no fluorescence under LWUV but glow weak chalky blue mainly along the blue matrix areas under SWUV. The fluorescent image obtained with DiamondView™ clearly reveal such texture in which small non-fluorescent pieces are adhered together by blue fluorescent matrix. (Figure 3)

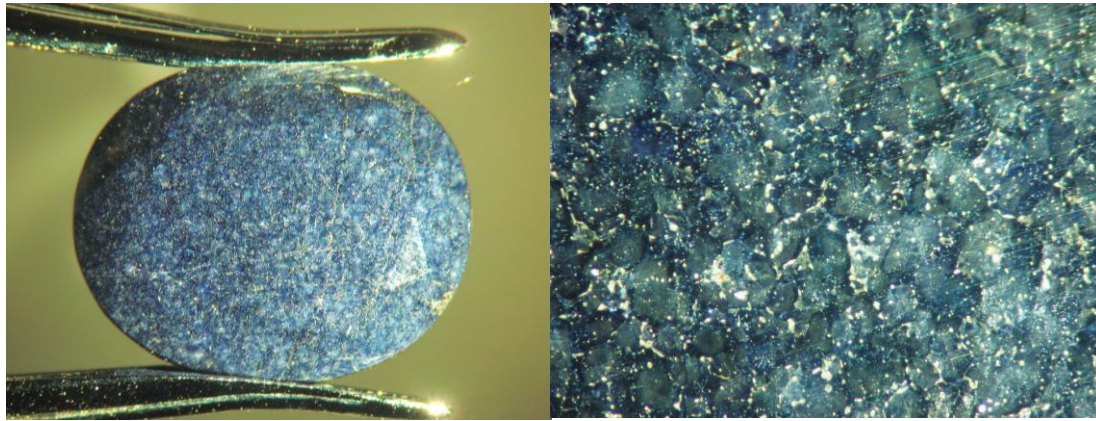


Figure 2: The appearance of stone under a microscope with strong fiber optic light (left) and a closed-up view of the surface showing corundum grains cemented by dark blue matrix. (photo: Marisa M.)

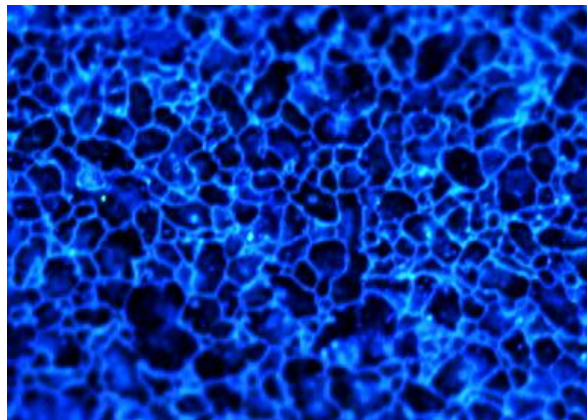


Figure 3: The DiamondView™ image showing bluish glow in the matrix part of the stone. (photo: Marisa M.)

In an attempt to identify the species of this new material with basic gem equipment, the test gave approximate RI values of ~ 1.77 which indicate corundum species (only one value could roughly be estimated due to the granular nature of those stones). Their SG values are 3.75 - 3.81 (slightly less than 4) which is expected for a composite material made up mainly of corundum.

The Raman spectroscopic analyses did confirm that the granular part was corundum while the matrix part gave only broad spectrum suggesting an amorphous material. Bulk semi-quantitative chemical analysis by EDXRF revealed alumina (Al) as the major constitute with rather high titanium (Ti) and iron (Fe) content which may be re-

sponsible for blue coloration in these stones. The spot analysis on matrix part also show minor amount of Silicon (Si) in addition to other mentioned elements. No heavy elements such as Lead (Pb), Bismuth (Bi) or Barium (Ba) could be detected in these stones. The X-ray image shows no high contrast area that consistent with their chemical analysis result. Unfortunately, due to the stones' opacity, the UV-Vis spectrum and Mid-IR spectrum cannot be obtained from both stones.

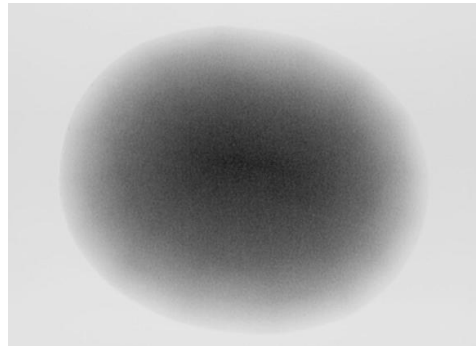


Figure 4: X-ray images of the two blue stones showing no opaque area.

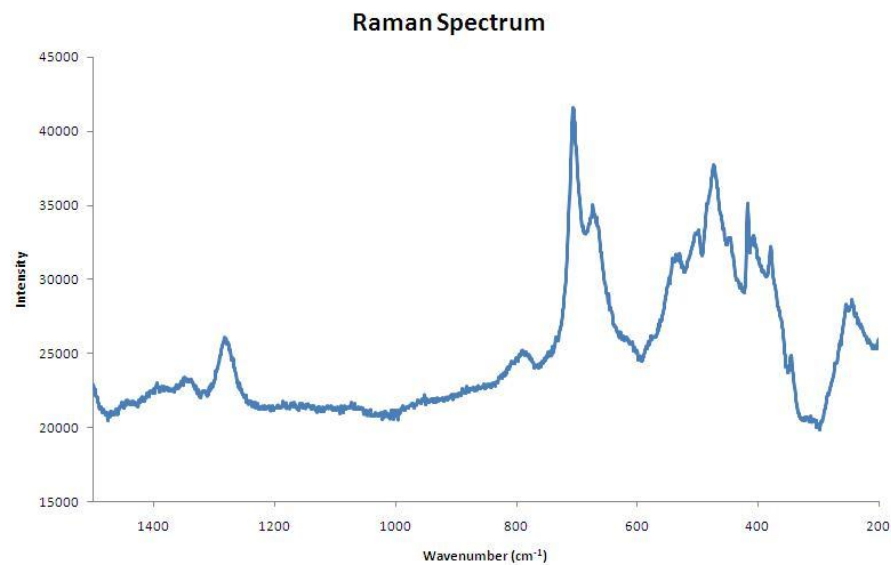


Figure 5: Raman spectra of these stones.

DISCUSSION AND CONCLUSIONS

Based on the aforementioned limited non-destructive testing (due to the stones' opacity) it seems that these two stones are a new type of man-made gem corundum that should be named “reconstructed sapphire”. In fact they are similar to other reconstructed gems such as reconstructed turquoise or reconstructed amber that are composed of small pieces assembled together to form a single stone. Fortunately enough, however, these stones are quite easy to recognize even with the normal 10X loupe in combination with simple gem testing. Of course we intent to carry out more detailed study on this type stone in order to fully understand how they were made up and what is the cause of color that may require somewhat more destructive methods. For the practical purpose, nonetheless, we strongly recommend traders and jewelers to carefully observe this type of gem material not to mixed-up with and/or miss-identify from the recently cobalt-glass treated sapphire. Because this new material is definitely belong to the category of man-made gemstone and must be fully disclosed at any point of sale in the market.

Thanong Leelawatanasuk and Marisa Maneekrajangsaeng

GIT- Gem Testing Laboratory

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