SYNTHETICS AND SIMULANTS

A Convincing Glass Imitation of Emerald

Figure 20: The green gem (12 × 10 mm) in this platinum and diamond ring strongly resembles emerald, but proved to consist of lead glass. Photo by B. Williams.

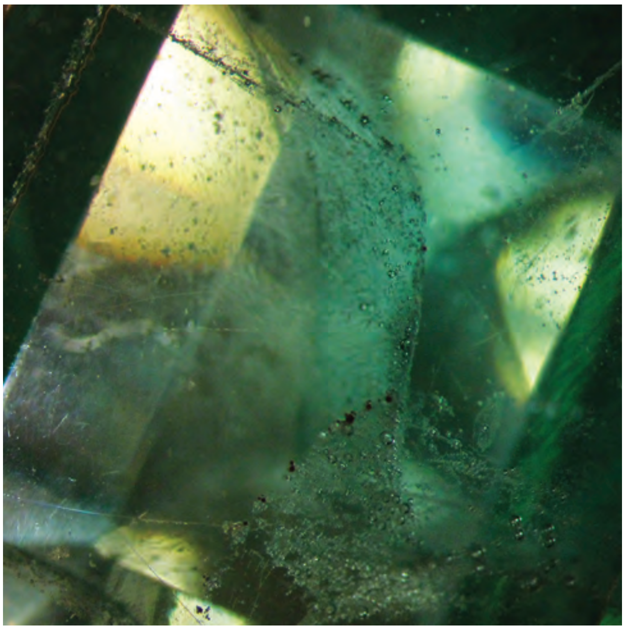

Figure 21: Microscopic examination of the green glass revealed straight and curved planar arrangements of gas bubbles. Photomicrograph by B. Williams; magnified 20×.

Recently submitted to Stone Group Laboratories for identification by Sushil Goyal (Liberty Gems, New York, New York) was a platinum and diamond ballerina-style ring featuring a large green gem (Figure 20). Its general appearance was typical of lighter-coloured Colombian emeralds, and it contained a few eye-visible inclusions. Closer inspection with a loupe revealed what looked like oiled fissures containing numerous minute, rounded gas bubbles (Figure 21).

In some cases, it is more interesting to run laboratory tests in the reverse order of what is typically done, especially when anticipating a certain result based on visual observations. In this case, due to 'something missing' from the gem's colour and its lack of reaction with a Chelsea colour filter, the next test performed was energy-dispersive X-ray fluorescence (EDXRF) spectroscopy to determine the gem's chemical composition and possible chromophores. This showed the unexpected presence of Pb, and since there was no significant Cr or V, further tests were in order. Raman analysis readily identified the gem as glass, but the nature of the strange veins containing tiny trapped gas bubbles remained a mystery. Fourier-transform infrared (FTIR) spectroscopy was performed next, but no polymers were detected. The RI was recorded as 1.52, and we concluded that this gem consisted of a solid piece of green lead glass.

Viewed with the microscope, an experienced eye might sense that there was something unusual about the 'emerald', but the veins of fine bubbles masked many of the properties that would normally indicate glass. The veins did not conform to a typical emerald fissure pattern, yet were not obviously 'wrong' in their appearance. Surface scratches and abrasions were more typical of glass than emerald. When observed with the Chelsea colour filter, the gem remained green despite having the general appearance of a Colombian emerald. Also, the broad table and low crown are not often seen with emerald, nor are they typical of imitation stones. The diamond mounting certainly added credibility to the centre stone.

The process of creating the inclusion features in this glass remains a mystery. Theoretically, cracks could have been induced and then filled with a different high-lead glass. Another possibility is that when the green lead glass was still molten, a wire could have been inserted, twisted and removed, leaving the material laced with gas bubbles.

This was the most recent item seen in a series of unusual and convincing glass imitations that have come through our laboratory in the past few years. These clever imitations are nothing like the more obvious examples commonly seen in gemmological coursework. Glass imitations of tiger's-eye, jadeite, peridot, tourmaline, aquamarine and now emerald have been encountered by these authors, and the tourmaline and aquamarine look-alikes initially fooled even experienced eyes looking for tell-tale signs. Outside of lab testing, the polariscope or refractometer will yield the best initial clues that a material is a glass imitation.

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New Large Black Synthetic Moissanite as a Black Diamond Imitation

Two black, opaque, flat round gems were received at GGTL-Laboratories (Geneva, Switzerland) in October 2014 for certification as black diamonds (Figure 22). The samples weighed approximately 29 and 34 ct, and measured 28.0–28.3 × 3.7 mm and 29.2–29.5 × 4.0 mm, respectively.

Figure 22: These large black diamond imitations (left, 29 ct and right, 34 ct) consist of very fine-grained synthetic moissanite. Photo by C. Caplan.

Microscopic observation piqued our attention because the gems did not show features consistent with natural black diamond (i.e. an irregular distribution of brown-to-black inclusions of various shapes, dense clouds, etc.), heat-treated black diamond (minute graphite inclusions), or 'classic' black synthetic moissanite (very dark green-to-blue or brown body colour, etc.). Strong fibre-optic illumination revealed a dark grey body colour with an olive tinge (Figure 23), and reflected light showed a very fine-grained homogeneous texture (Figure 24-left). The microtexture was very similar to that of a black ceramic material (boron carbide) imitating black diamond that was described by Choudhary (2013; see Figure 24-right), but was different from the mosaic pattern in black synthetic moissanite described by Moe et al. (2013). Minute interstitial spaces in our samples measured 5–150 µm (mostly ~50 µm).

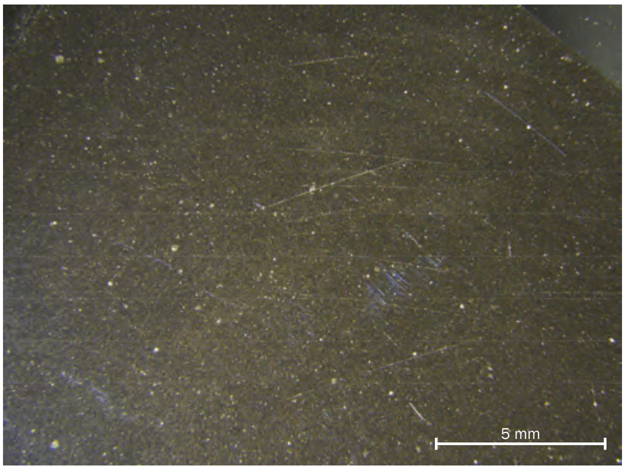

Figure 23: Viewed with the microscope and 250 W fibre-optic illumination, the synthetic moissanite samples showed a dark grey body colour with an olive tinge. Photomicrograph by F. Notari.

The two gems were inert to long- and short-wave UV radiation, but showed faint orange fluorescence when exposed to the intense 300–410 nm excitation of the GGTL DFI luminescence microscopy system. Their RI was over the limit