A convincing glass imitation of larimar (pectolite)

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Larimar, a massive blue variety of the mineral pectolite ($NaCa_2Si_3O_8(OH)$), belonging to the wollastonite group of minerals is known in the trade for few decades now. However, in recent times it has gained popularity amongst jewellery designers and consumers, as suggested by high frequency of submissions at the laboratory for certification. Originating only from the Dominican Republic, its striking blue colour with light blue to white waves or web like patterns caused by the spherulitic growth has made larimar a sought-after gemstone.

With increasing popularity, larimar has been subject to imitation by various materials, including ceramics (Kiefert and Groenenboom 2013) and naturally dyed stones such as chalcedony (Miura, 2020). Similar man-made ornamental materials were produced as early as the 1950s, including the well-known 'Victoria Stone' (Renfro, 2017).

The present author has examined numerous specimens of translucent to opaque partly devitrified glass submitted to the laboratory, many of which closely resemble larimar in both appearance and colour—making them convincing imitations. These materials are reportedly being presented as larimar at both online and offline platforms. This study documents the gemmological characteristics of this glass imitation of larimar encountered at the laboratory over the past one and a half years, sourced from a local gem dealer.

Results and Discussion

Visual appearance

Rough samples, slices, and polished cabochons of both larimar and the larimar imitation were selected for this study. Majority of larimar as well as imitation samples were opaque, however, using strong fibre optic light few sections appeared translucent. Larimar specimens exhibited colours ranging from blue to greenish blue, with characteristic white web-like patterns (Figure 1, left). In comparison, the larimar imitation (partly devitrified glass) samples ranged from greenish blue to bluish green and displayed similar white webbing, particularly evident in sliced sections (Figure 1, right). In cabochon form, the imitation samples often featured a darker central core surrounded by a radiating fibrous and whitish zone. This fibrous zone also exhibited a noticeable sheen or chatoyant effect.

Cross-section of rough imitation samples displayed radiating fibrous structure typically associated with spherulitic growth, while the outer surface (crust) had a transparent glassy layer with botryoidal pattern (Figure 2, left and right).

Properties

Gemmological properties of the studied samples of larimar and larimar imitation are summarized in Table 1.

Raman spectroscopy was performed on larimar and larimar imitation samples using a 532 nm excitation laser, covering the spectral range of 100–2000 cm^{-1} (Figure 3). The larimar samples exhibited a rising background absorption from 200 to 2000 cm^{-1}, attributed to fluorescence, with major peaks observed at approximately 651and 1025 cm^{-1}, along with smaller features at ~317, 375, 413 and 970 cm^{-1}.

The opaque or crystalline areas of the imitation samples displayed a consistent spectral pattern across multiple spots, characterized by major peaks at approximately 635 and 970 cm^{-1}, and additional smaller or broader features at ~331, 413 and 1042 cm^{-1}. Interestingly, few features such as ~413 and 970 cm^{-1} were present in spectra of both, larimar and crystalline areas of imitation samples suggesting a similarity in composition and structure. Raman spectra of crystalline areas of the imitation were consistent with that of wollastonite given in the RRUFF database and elsewhere (e.g., Hänni *et al*., 2001). Peak at ~970 cm^{-1} is present as

the major feature in glass, while present only as a weak feature in pectolite. Further, the peak at ~635cm^{-1} present in glass shifts to peak at 651cm^{-1} in larimar, while the peak at 1025cm^{-1} present in larimar shifts to 1042cm^{-1} in the devitrified glass. In contrast, the transparent glass crust of the larimar imitation exhibited broad bands in the ranges of approximately 370–620 cm^{-1} and 800–1100 cm^{-1}, consistent with the spectral signature typical of amorphous glass.

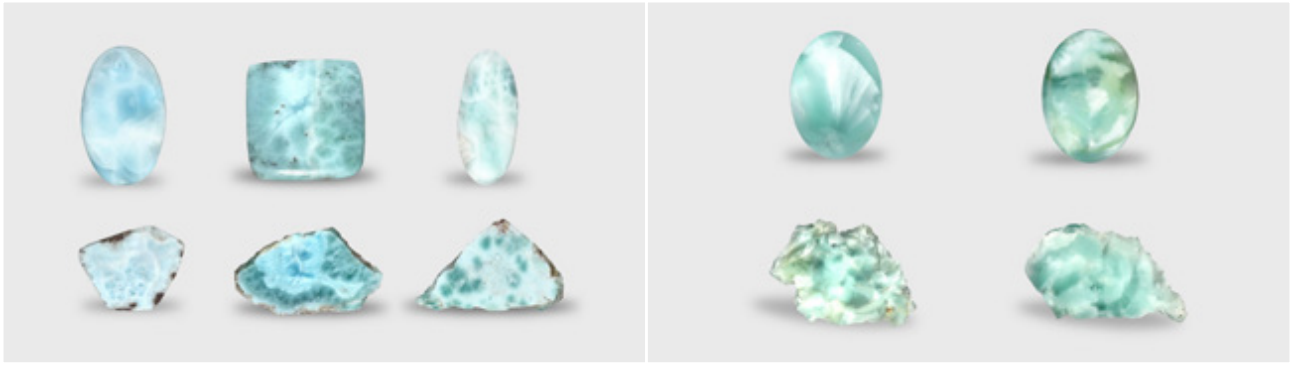

Figure 1: Representative cabochon and sliced rough samples of larimar (left) and glass imitation (right), displaying a close resemblance in colour—ranging from greenish blue to bluish green—and white web-like patterns. The left cabochon in glass (right image) also exhibits a notable sheen effect due to fibrous inclusions. Photos by G. Choudhary.

Figure 2: Rough sample of devitrified glass showing an opaque radiating pattern originating from a central core and terminating in circular edges, indicative of spherulitic growth (left).
In contrast, the surface or crust of the same sample exhibits a transparent, glassy layer with a botryoidal pattern (right).
Photos by G. Choudhary.

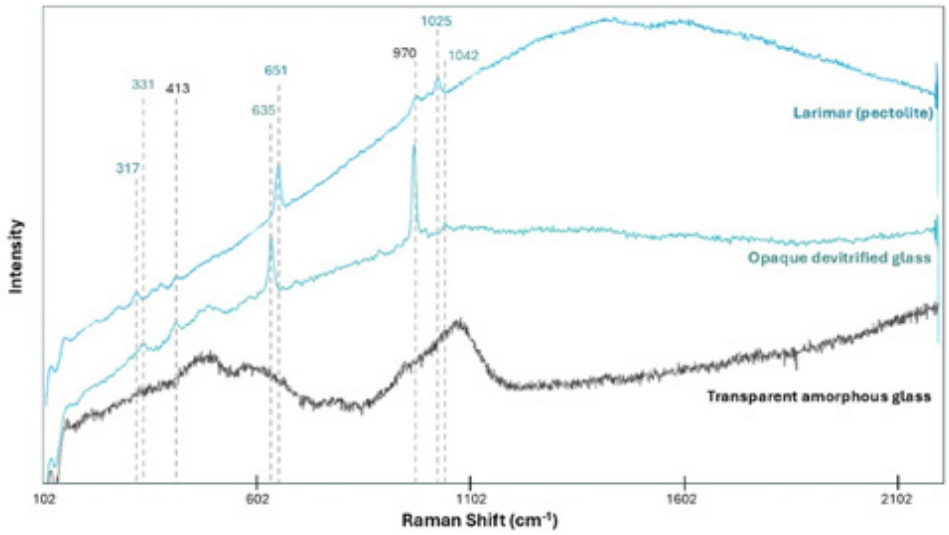

Figure 3: Raman spectra of larimar (blue), opaque devitrified glass (blue-green), and amorphous glass matrix (black).

Property	Larimar	Larimar imitation
Colour	Blue to greenish blue; white webbing	Greenish blue to bluish green; white webbing
Diaphaneity	Opaque under standard lighting; few sections translucent under fibre optic light	Opaque under standard lighting; few sections translucent under fibre optic light. Top surface transparent.
RI	~1.60 (spot); distinct birefringence blink ranging from ~1.58 – 1.62	~ 1.49 (spot); no birefringence blink
SG (hydrostatic)	2.83 – 2.87	2.54 – 2.58
UV Fluorescence	Moderate to distinct yellowish green in shortwave; inert under longwave	Weak yellowish green in shortwave; inert under longwave
EDXRF analyses	Major: Ca, Si, Al, Na, Mg Minor: Cu, Fe, Mn, K Traces: V, Sr, Zn, Ti, Ni	Major: Si, Ca, Al, Na, K, Fe, Mg Minor: Ti, Zr, Traces: Sr, Rb, W, Mn, Sn, Zn, Pb
Raman analyses	Major peaks: ~651 and 1025 cm^{-1} Weaker features: ~317, 375, 413 and 970 cm^{-1}	Crystalline areas Major peaks: ~635 and 970 cm^{-1} Weaker features: ~331, 413 and 1042 cm^{-1} Amorphous areas (glass crust) Broad bands in the range ~370-620 and 800-1100 cm^{-1}

Microscopic examination

The larimar imitation samples exhibited fine fibrous inclusions (Figure 4) arranged in a radiating pattern originating from distinct cores. In several specimens, multiple such cores were present, resulting in a botryoidal or spherulitic appearance. These fibrous inclusions often produced a sheen effect, contributing to the visual similarity with natural fibrous minerals. The inclusions themselves were colourless, showed well-defined growth striations along their lengths, and displayed fine cracks reminiscent of cleavage features commonly observed in minerals with prominent cleavage perpendicular to the crystallographic c-axis.

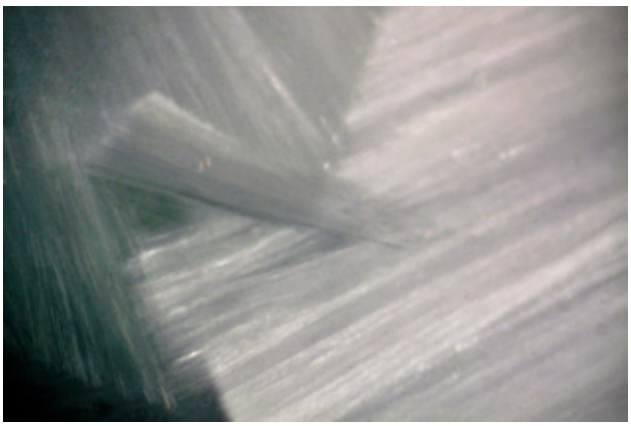

Figure 4: Fine, tightly packed, intergrown fibrous crystals arranged in a radial to subparallel pattern in opaque areas of glass-imitation of larimar. Photomicrograph by G. Choudhary; image width 5.08mm

Similar lath-like crystals in a glass matrix have previously been reported to be wollastonite (Hänni *et al*., 2001) or apatite (Renfro, 2017), tanohataite and cristobalite (Fayed *et al*., 2025). However, Raman spectroscopic analysis of the inclusions in the present study was consistent with that of wollastonite.

Conclusions

The described partly devitrified glass serves as a convincing imitation of larimar (pectolite) due to its similar webbing pattern and visual appearance, which may potentially mislead gemmologists and gem dealers. However, standard gemmological properties, including RI and SG, allow for easy distinction between partly devitrified glass and larimar, supplemented by Raman spectroscopy and chemical analysis. These imitations typically show higher concentrations of Si and Al, and lower Ca content compared to larimar. Additionally, the presence of coarse, needle-like microscopic structures resulting from devitrification provides further diagnostic evidence for separation. Although the identification and separation of this partly devitrified glass are not particularly challenging, raising awareness about its existence is crucial to prevent misidentification in the gem trade.

References:

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