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Ugo Hennebois, Aurélien Delaunay, Stefanos Karampelas, Emmanuel Fritsch

► **To cite this version:**

Ugo Hennebois, Aurélien Delaunay, Stefanos Karampelas, Emmanuel Fritsch. Hyalite with Magnificent Internal Features. *Gems & Gemology: the quarterly journal of the Gemological Institute of America*, 2022, 58 (1), pp.66-67. hal-03791906

HAL Id: hal-03791906

<https://hal.science/hal-03791906>

Submitted on 31 Jul 2024

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Hyalite with Magnificent Internal Features

Ugo Hennebois, Aurélien Delaunay and Stefanos Karampelas - Laboratoire Français de Gemmologie LFG

Emmanuel Fritsch - University of Nantes

The Laboratoire Français de Gemmologie (LFG) received for analysis a 1.83 ct hyalite, also known as opal-AN: an amorphous (A) opal containing hydrated silica molecules that are network forming (N) (E. Fritsch et al., “Green-luminescing hyalite opal from Mexico,” *Journal of Gemmology*, Vol. 34, No. 5, 2015, pp. 490–508). This is one of the rarest varieties of gem-quality opal. The gem fluoresced green under long-wave ultraviolet (365 nm) and, with more intensity, under short-wave UV (254 nm), due to U6+ in the form of uranyl (UO₂)²⁺ (E. Gaillou et al., “Luminescence of gem opals: A review of intrinsic and extrinsic emission,” *Australian Gemmologist*, Vol. 24, No. 8, 2011, pp. 200–201). A purple fluorite (identified by a micro-Raman spectrometer; figure 12) and a series of cube-shaped cavities were visible (figure 13) in the hyalite, which appear to be all interconnected. Sometimes these cavities also contain small crystals of fluorite relics detected by Raman. Thus, these cavities may be the result of the partial dissolution of fluorite crystals. This would explain their cubic morphology, which cannot be explained by the dissolution of amorphous hyalite.



Figure 12. Purple fluorite cube, identified by micro-Raman spectroscopy, in a hyalite. Photomicrograph by U. Hennebois; field of view 1.2 mm.



Figure 13. Interconnected cavities observed in a hyalite containing partially dissolved fluorite relics identified by Raman spectroscopy. Curved growth layers are also observed in the background. Photomicrograph by A. Delaunay; field of view 2 mm.



Figure 14. This fluid inclusion contains mostly a gaseous phase. It is trapped at the intersection of curved botryoidal growth zones and presents high-order interference colors obvious between crossed polarizers. Photomicrograph by U. Hennebois; field of view 1 mm.

Between crossed polarizers, high-order interference colors were observed (figure 14), as expected for this gem. This is due to anomalous birefringence linked with the strain present between the curved growth layers of hyalite. Also, a fluid inclusion was observed in the intersection of the botryoids (again, see figure 14). This inclusion is composed mostly of gas, suggesting that this hyalite was deposited from a gaseous phase. Although some of these features have been previously observed in hyalite, it is rare to see them all in the same sample. To the best of our knowledge, this is the first reporting of pronounced cubic cavities in hyalite.