SPURIOUS DIAMOND (SYNTHETIC MOISSANITE)

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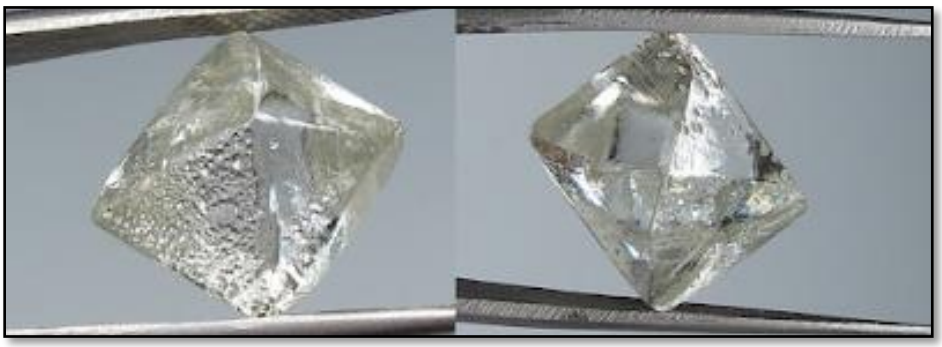
Most common form for Natural Rough Diamond is octahedron, a form with 8 similar and equilateral triangle faces, each meeting the three crystallographic axes (a, b & c) at equal distance. Any colorless or near colorless stone of octahedron form with good luster is perfect enough to deceive.

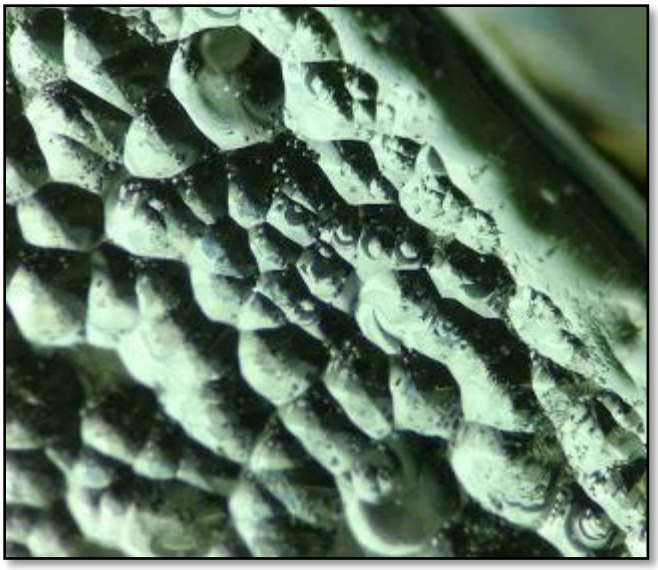
Such spurious diamonds, which are not actually diamond but are rather some other natural or synthetic stone, are getting frequent to encounter.

IGI-GTL, Delhi received one such Diamond mimicking Tinted White 10.31ct Synthetic Moissanite, measuring 12.29 x 10.10 x 11.61 mm, for routine testing.

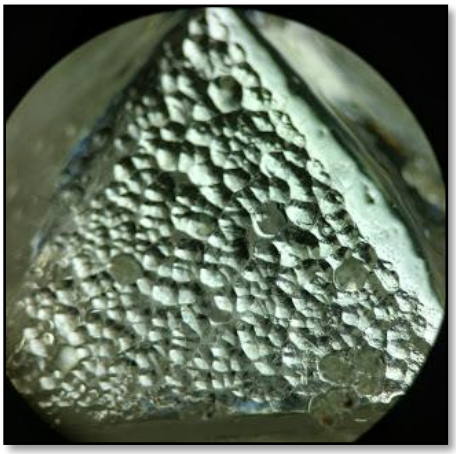


Synthetic Moissanite, fashioned like a Octahedron form

With unaided eyes, 2 opposite faces of the crystal were observed fully covered with irregular depressions, resembling it to the surface of some natural rough crystal with growth markings. Closer examination under high magnification revealed those irregular depressions as sub-hexagonal depressions, probably formed due to etching, resembling to basal plane dislocations found on as grown synthetic Moissanite crystals. On these depressions, sharp random pits were also observed.

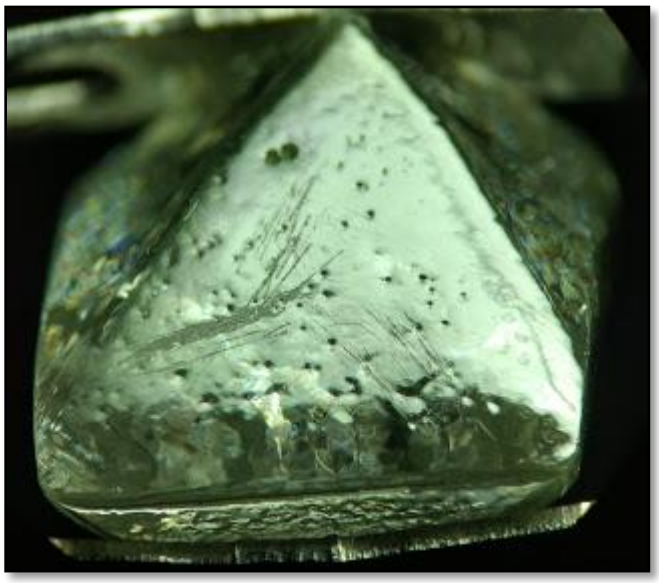


Sub-hexagonal depressions, note irregular sharp pits present between depressions



Sub-hexagonal depressions on face of Synthetic Moissanite, covering whole face

Other faces of the stone were not densely covered with depressions or markings, rather were carrying random holes, which were found to be conical under high magnification.



Random conical holes

These conical pits were penetrating through the stone from one face to another, forming pipes or tubes perpendicular to C axis, with both endings of conical shape.

Conical tubes forming pipes or tubes from one face to other

Silicon droplets were also observed over the tubes, suggesting that those droplets were trapped while the formation of tubes only, or may be formation of tubes are somewhere the result of these droplets formation.

Silicon droplets over the tubes, circled red

Cluster of black material was also noticed under magnification, which was probably carbon inclusion. Several deliberate scratches were present on the stones surface, which shows that destructive test of hardness check has been applied on the stone in a crude way, during the attempt to identify or confirm its identity as diamond.

Carbon inclusion

Deliberate scratches on stone's face

Stone showed Doubly Refractive nature under the crossed polars (polariscope), SG was recorded as 3.21, and IR spectrum along with magnification features stone identity was confirmed as Synthetic Moissanite.

References:

Physical Vapor Transport (PVT) Growth (with focus on SiC and brief review on AlN & GaN) by Peter J. Wellmann, Crystal Growth Lab, Materials Department 6, University of Erlangen,G ermany, peter.wellmann@ww.uni-erlangen.de

Lab Information Circular, GTL, Jaipur, Vol. 76, July 2018

G&G, 2017 Winter, page 462, SYNTHETIC MOISSANITE, Imitating Rough Diamond