

Beyond Octahedra: Inclusions in Spinel 尖晶石中八方體以外的內含物

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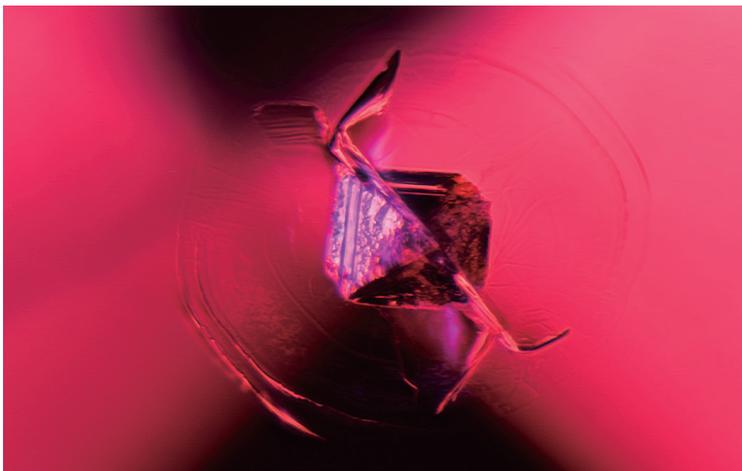
作者分享一些在不同產地的尖晶石中，除了八方體以外，其他形態的內含物圖片。

Spinel inclusions

When gemmology students are taught about spinel, one of the first things they are told to look for are octahedral crystals. These echo the form of spinel crystals and look like

little bipyramid shapes inside the spinel. Although they are a classic, diagnostic feature, there are many other interesting inclusions to be found in the spinel realm.

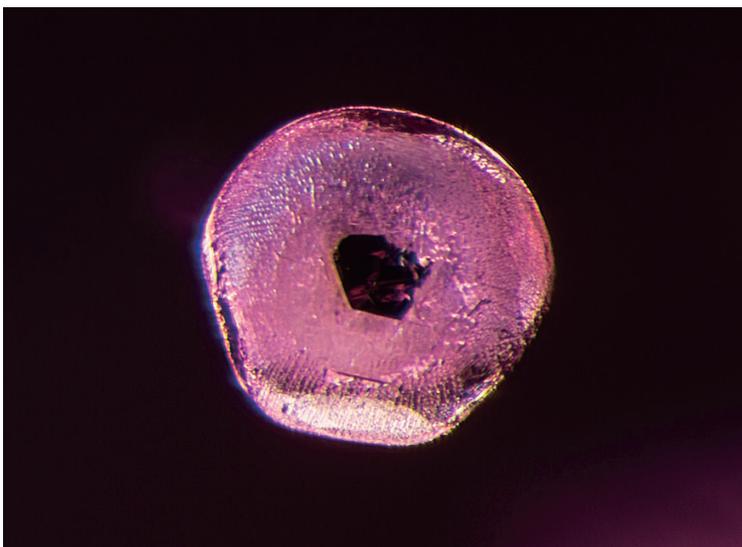
The following are a few examples the author has had the opportunity to photograph in the laboratory.



This is an octahedral crystal, a typical feature to look for when identifying spinel.

Darkfield + oblique fibre optic illumination.

Photo: E. Billie Hughes



We are sure Homer Simpson would love this one! This donut-shaped inclusion is an apatite crystal, common in spinel from both Burma (Myanmar) and Sri Lanka. The black flake in the centre is actually a graphite crystal, creating what master photo-micrographer John Koivula has whimsically nicknamed “belly button” apatite crystal.

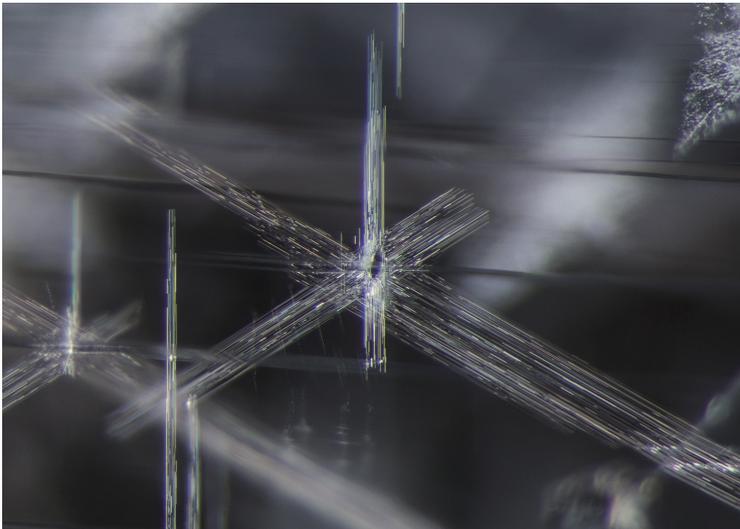
Oblique fibre optic illumination.

Photo: E. Billie Hughes



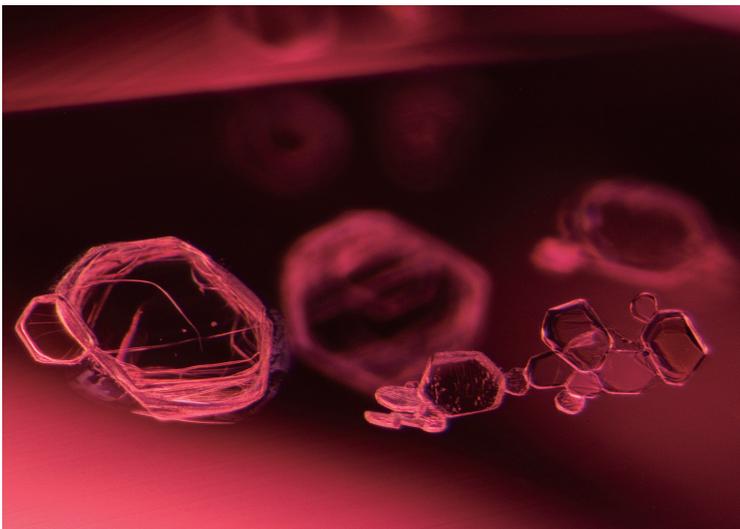
More apatite crystals on display. When viewed under crossed polars as shown on the left, the crystals display a rainbow of interference colours.

Photo: E. Billie Hughes



Stellate dislocations decorate the interior of this spinel from Vietnam. We often see such dislocation needles in material from Sri Lanka, too.

Diffuse oblique fibre optic illumination.
Photo: E. Billie Hughes



Small transparent crystals form clusters in a Vietnamese spinel. These tabular crystals are transparent and doubly refractive.

Dark field illumination.
Photo: E. Billie Hughes



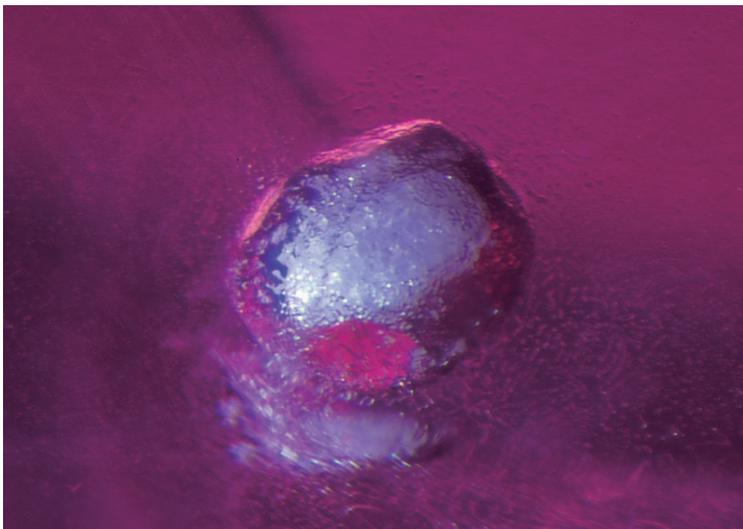
At first glance the tiny exsolved particles in this spinel from Mahenge, Tanzania, may look like specks of dust. Upon close observation we can see that they are actually scattered throughout the stone, not on the surface. These dust-like particles are a common feature in Mahenge spinel.

Diffuse oblique fibre optic illumination.
Photo: E. Billie Hughes



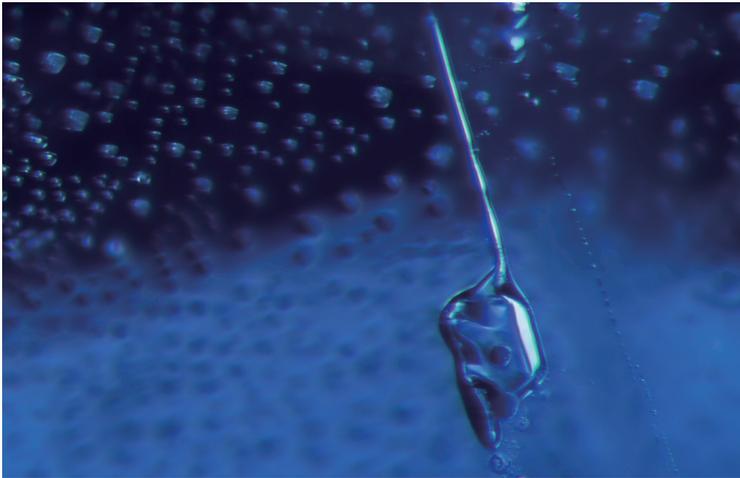
Another common feature in spinel from Mahenge, Tanzania, are these fine, needle-like inclusions. These are most easily seen with fibre optic illumination, as shown here.

Diffuse fibre optic illumination.
Photo: E. Billie Hughes



This melted crystal shows a "frosty" appearance similar to that of a snowball. The vast majority of spinels that we see in our lab are untreated, but this is a rare example of a heated spinel. The host of this melted crystal is a Mahenge, Tanzania, spinel.

Darkfield + Diffuse oblique fibre optic illumination.
Photo: E. Billie Hughes



In another example of a heated spinel, this time in a cobalt-diffused stone, a melted crystal stands out against a backdrop of tiny, heat-altered octahedra. Note how the faces of the crystals all display a highly reflective, glassy appearance, and the edges are rounded rather than angular.

Dark-field illumination.

Photo: E. Billie Hughes

References

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