

# MICRO-FEATURES OF SPINEL

Nathan Renfro, John I. Koivula, Shane F. McClure, Kevin Schumacher, and James E. Shigley



Spinel has long been an underappreciated gem, often placed in the shadows of its traditionally more expensive gemstone cousin, the ruby. Historically, red spinel was visually mistaken for ruby before being acknowledged as its own mineral species, the most notable being the Black Prince's ruby which adorns the Imperial State Crown on display in London. In recent years, spinel has seen a significant rise in popularity and is recognized as one of three birthstones for August. Spinel's appeal may be due in part to its range of colors, from red to pink, purple, blue, gray, and orange (figures 1 and 2).

Spinel is an isometric mineral that often forms as a result of contact metamorphism, finding its home in magnesium-rich dolomite marbles, as is the case with spinel from Myanmar and Pakistan. Other notable spinel sources are Sri Lanka, Tanzania, and Tajikistan.

Inclusions found in spinel often reflect the geologic conditions in which they form, with carbonate inclusions (such as calcite) being quite common, as well as apatite crystals. Notably, many spinels contain well-formed octahedral negative crystals that are typically filled with solid minerals, fluids, or a combination of both. Metal sulfides are occasionally present, as well as intergrowths of needle- or plate-like crystals of rutile or sphene that cause asterism.

Treatments for spinel are generally few, with reducing the visibility of fractures by filling them

*Figure 1 (above). Spinel is available in a wide range of colors, as seen in this suite of round gems weighing 1.47–6.70 ct faceted by Bill Vance. Photo by Robert Weldon/GIA; courtesy of Vance Gems.*

*Figure 2 (opposite page). This remarkable suite of spinel gems faceted by Bill Vance shows a wonderful range of color and transparency. The 232.9 ct rough mineral specimen gives clues to the crystal's origin, with remnants of the marble host rock preserved. The faceted red spinels range from 2.47 to 5.87 ct. Photo by Robert Weldon/GIA; courtesy of Vance Gems.*



with a refractive index matching material being one most likely encountered as a form of clarity enhancement. Some spinels are also heat treated to improve clarity, but those stones are generally uncommon in the trade; they are readily detectable in a gemological laboratory using photoluminescence or visible spectroscopy, but the treatment often leaves little evidence seen in the microscope. Synthetic spinels are commonly encountered, with flame-fusion material being widely available in a broad range of colors. More technologically sophisticated materials also exist, such as flux-grown

spinel. However, those examples are generally available only in red or blue gems or crystals and are relatively scarce.

This latest installment in the *G&G* chart series showcases a wide range of inclusions that a gemologist might encounter in spinel. Unlike previous charts, however, the authors also chose to highlight a few examples of spinel as an inclusion in other gem materials. Though far from comprehensive, the selected images will hopefully provide the reader with a good representation of the micro-features found in spinel.

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## Spinel Inclusions Chart

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