

Lab Created Spinel

With the fast growing market for lab created gemstones we have received several inquiries about the identification of synthetic spinel. As a result we thought we would share information today from our ISG Identification of Synthetic and Treated Gemstones course to provide our readers with an update on how to identify this gem material which is becoming more and more popular on the market. We will start with the basics and move through some unusual specimens we have found that you may want to be aware of during your gemstone buying, selling and appraisal.

Below is the classic Chelsea filter reaction to flame fusion synthetic blue spinel. This reaction is well documented in gemological texts due to cobalt which is used to create the blue color.



Another classic "tell" of lab created spinel is the slightly elevated refractive index reading due to the higher level of aluminum used to grow the flame fusion boule. As seen at left, this reading of 1.73 was taken from the green synthetic spinel seen further down in this edition. It should be noted that the elevated refractive index may vary by as much as .01 to .03 (Handbook of Gem Identification, Liddicoat, 12th edition, pp 97), but the main issue is that the ratio of alumina to magnesia is elevated in the synthetics causing a slightly elevated refractive index reading in the lab created as opposed to the natural.



You should know that there is a natural cobalt colored blue spinel from a small deposit in Sri Lanka (Handbook of Gem Identification, Liddicoat, 12th edition, pp 98) the supply of this material is termed "very rare" by Liddicoat and would be a very unusual find on the market.

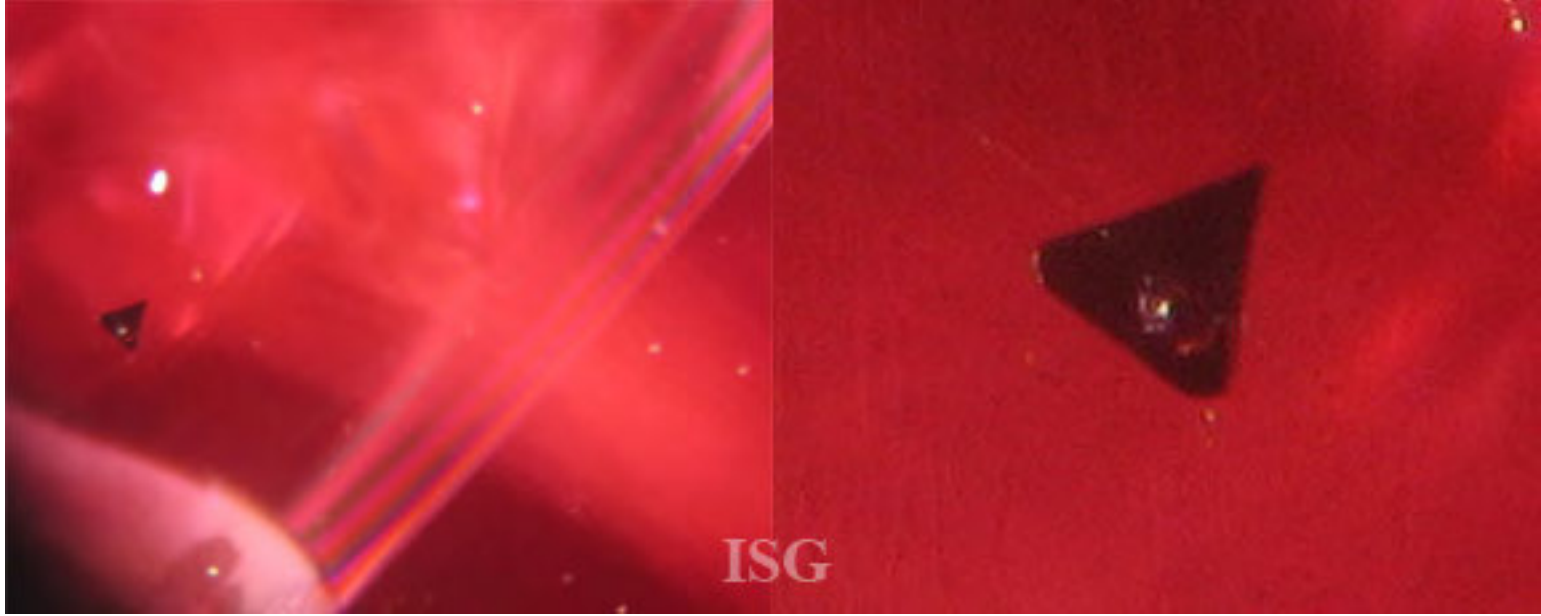
Another important issue for identification of the lab created spinel is, as with many lab created gemstones, the strong absorption bands due to elevated coloring elements used in the creation process. (JKHarris.co.uk) In the spectrum of this dark blue spinel at right from the ISG reference collection, the cobalt absorption bands are very clear in this hand held diffraction grating spectroscope. Based on the high concentration of coloring elements added to many lab created gemstones to produce the finest colors, it is common for the spectra of these stones to be very strong and pronounced.



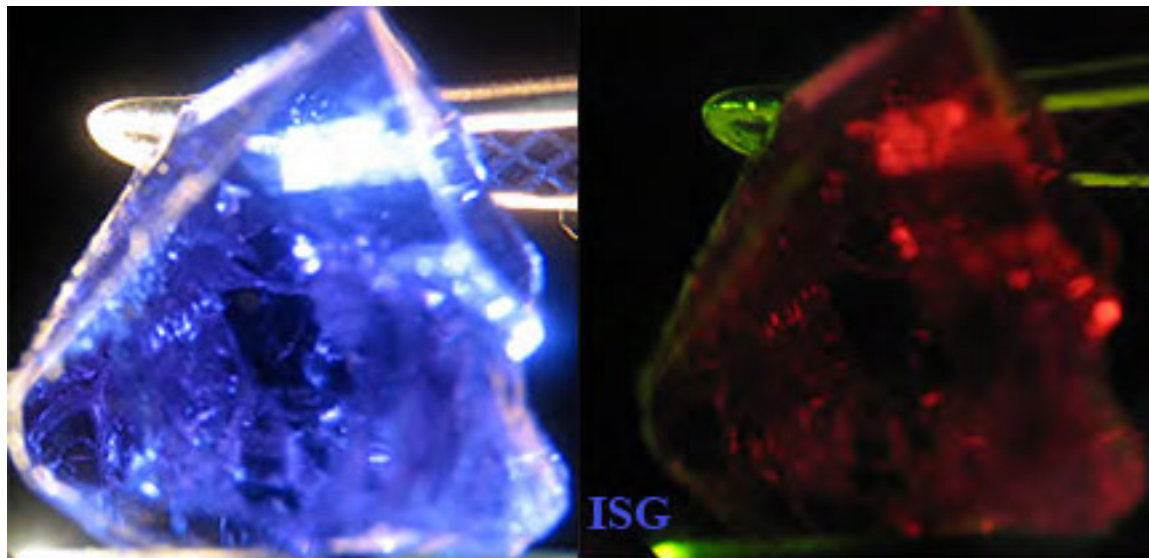
At left is an octahedral crystal of lab created red spinel created using the flux melt growth method. The use of a platinum crucible will very often leave small platinum platelets inside these gemstones as seen below. Below left at 30x and below right at 120x using our [Meiji Techno](#) microscope.

An important note on this specimen seen at left, the formation process of these flux grown crystals creates a lot of internal stress in the stones. As a result it is rare to find a complete specimen intact. If you get the opportunity to obtain one of these that shows significant crystal structure it would be a great addition to anyone's

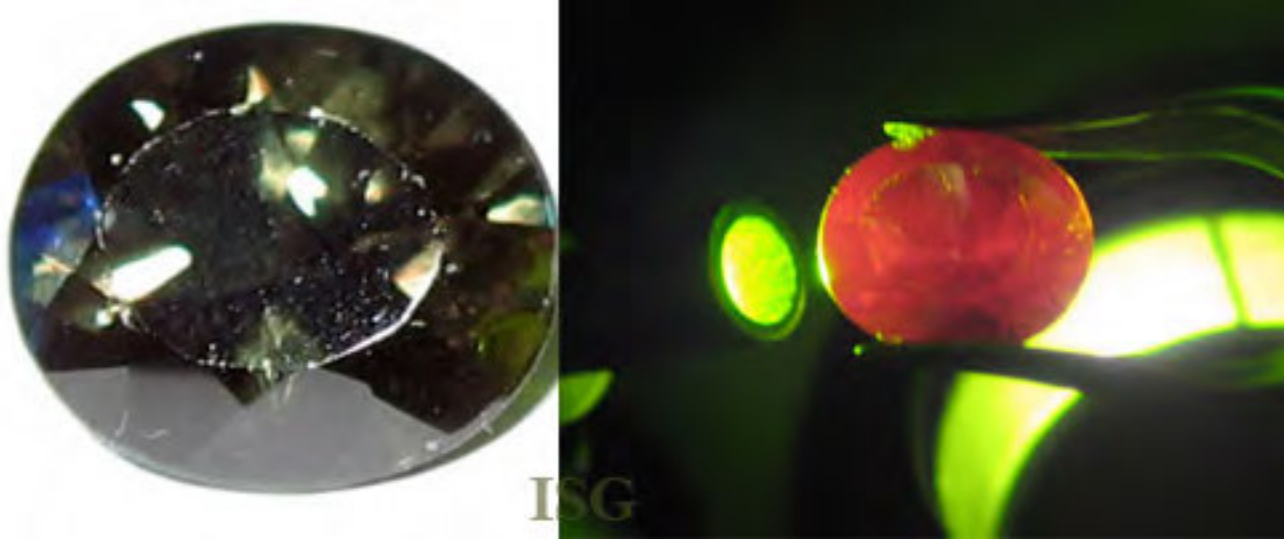
study specimen reference group.



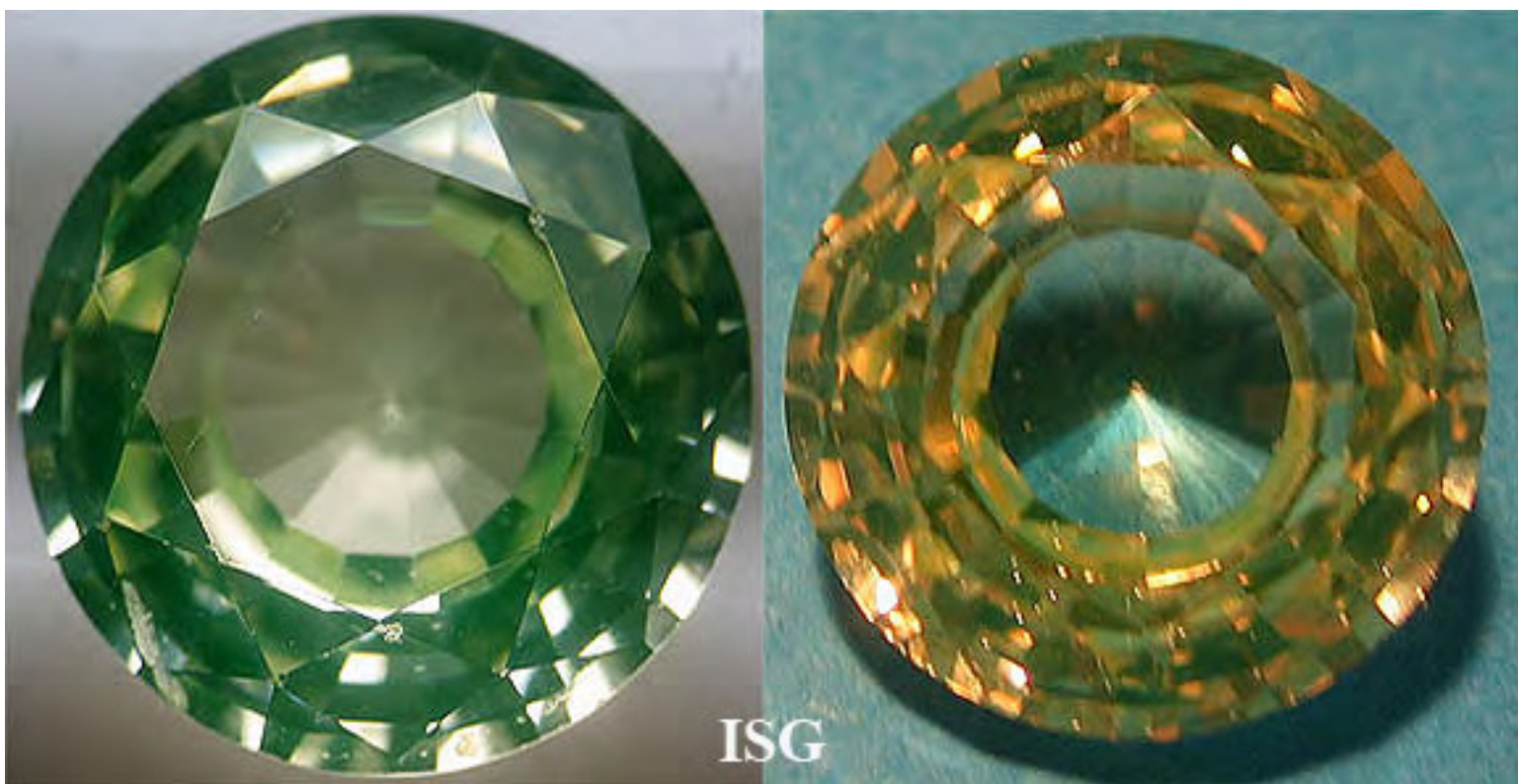
We are fortunate to have obtained both a red and blue flux grown specimen of the lab created spinel with the blue shown below left. Below right is this specimen seen through the Chelsea filter, once again showing the very strong reaction of the cobalt used as the coloring element of the stone.



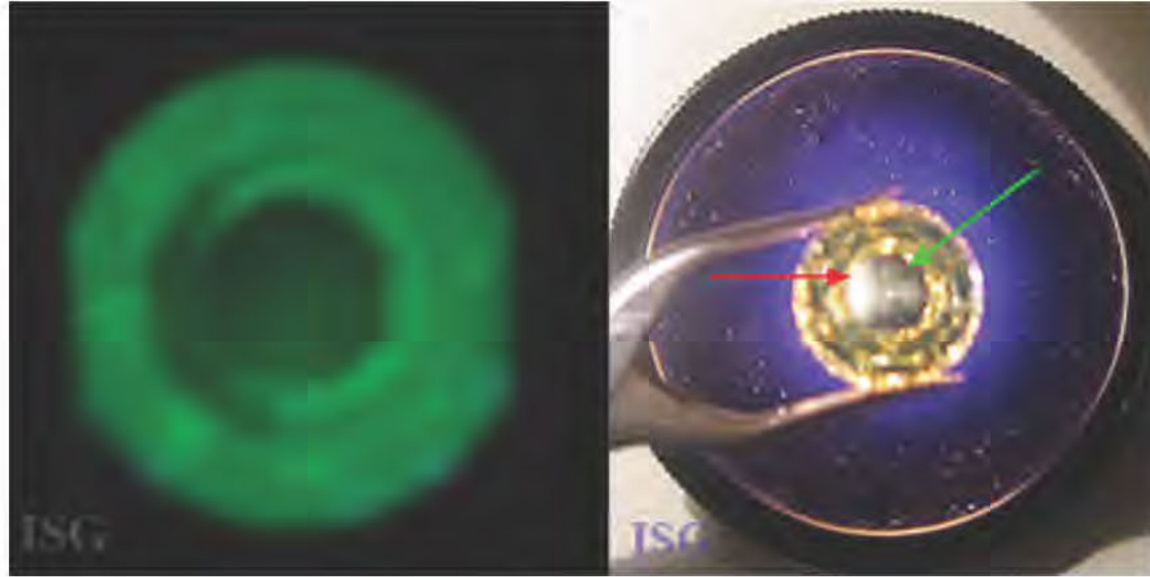
Perhaps the most important issue on the lab created spinel is that they are being created in colors not normally covered in most textbooks. Below is a green faceted gemstone that was sold as tourmaline. The refractive index was an obvious indicator that this was not tourmaline, but the Chelsea filter reaction was totally unexpected as seen below right. By use of the Chelsea filter and refractometer we were able to verify this as a lab created spinel that was colored by unknown elements in addition to cobalt to give the green color.



Another unusual specimen is the color change spinel seen below. This specimen was sent to us for identification and later donated to our study collection. The color change is pronounced as seen in the images below, and was at the time a rather unusual color combination for a lab created spinel based on the average market supplies of synthetic spinel.



Beyond the elevated refractive index we found a very strong reaction to ultraviolet as seen below left, and the important feature of very strong anomalous double refraction through the polariscope that is considered common in flame fusion synthetic spinels. (Photoatlas of Inclusions, Koivula, Vol 2 pp 721). The pronounced "tabby" extinction of this specimen through the polariscope further verified it as a flame fusion spinel that has been doped with elements to give it this color change reaction.



We hope this review of lab created spinel is of benefit to our readers. We remind you that the ISG offers the only course on the *Identification of Synthetic and Treated Gemstones* through our ISG website: www.SchoolofGemology.com. We offer this course as part of our ISG Registered Gemologist and Registered Gemologist Appraiser programs. Course comes with access to our www.GemstoneTreatmentReport.com website.

We welcome you to join us for the finest quality gemological study at the most affordable tuition price in the industry.



Robert James
President, ISG

This course, listed as the Gemstone Treatment Report, has been reviewed and approved for insurance license Continuing Education by the Texas Department of Insurance and others. [Course #80928 Texas Department of Insurance Provider #33143](#)

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