LEPIDOLITE WITH SIMULATED MATRIX

By John I. Koivula and C. W. Fryer

This article describes a crystal of gem-quality lepidolite (a lithium mica) with a simulated matrix. Under magnification, numerous gas bubbles were observed in the glue that was used to attach the crystal to the matrix. The main crystal was identified as lepidolite by means of X-ray diffraction.

The authors recently examined an unusual crystal in matrix (figure 1). The crystal specimen, which measured approximately 6.0 cm × 1.7 cm, reportedly came from Brazil. At first glance it looked very much like a fine pink tourmaline in matrix, complete with typical surface striations parallel to the length of the crystal. However, the specimen was much too lightweight to be tourmaline. It was obvious that a more detailed examination and some tests were needed to correctly identify the material.

TESTING PROCEDURE

The specimen was first examined carefully under the microscope. It was immediately apparent that the "matrix" was not natural, but had been glued to the crystal. As illustrated in figure 2, the "matrix" contained several areas of an epoxy-like glue in which gas bubbles were trapped. A thermal reaction test carried out on both the "matrix" and the crystal showed that the material simulating matrix was indeed glued on and that some of the glue had been smeared onto the surface of the main crystal, giving it a plastic-coated appearance in a number of areas. A slightly acrid odor and a small puff of white smoke were produced when the hot point was applied to the glue.

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Figure 1. The test subject: a translucent crystal of lepidolite, a lithium mica, with applied matrix, 6.0 cm long × 1.7 cm wide.

We also noted that the "matrix" was composed of numerous small, rounded pebble-like grains that suggested extensive alluvial transport. However, a pink and a green crystal fragment (figure 3) attached at either end of the "matrix" showed very few signs of abrasion. In addition, the large

Figure 2. These gas bubbles trapped in the epoxy-like glue used to affix the matrix provided clear evidence that the specimen had been constructed. Oblique illumination, magnified 30 $\times$.

pink crystal did not show any signs of alluvial abrasion. Gross inconsistencies, to say the least.

Under magnification, the natural-appearing surface striations running lengthwise on the crystal indicated a lamellar internal structure. There was no question now that the pink crystal was natural; it also appeared to be micaceous (figure 4).

Figure 3. This small green crystal fragment was attached to one end of the applied matrix. Unlike the "matrix," it showed few signs of abrasion. Magnified 6 $\times$.

Since the large pinkish crystal was translucent, the specimen was checked with a spectroscope, polariscope, and dichroscope. No absorption spectrum was observed using a Beck spectroscope. The polariscope reaction was inconclusive, but the dichroscope showed definite lighter and darker shades of pink, proving the stone to be doubly refractive. During testing with ultraviolet radiation, only the glue reacted, fluorescing a pale whitish yellow. Because of the micaceous structure observed in the main pink crystal and the similarity of this specimen to a specimen of lepidolite that was pictured in a recent book (Sauer, 1982), lepidolite was next suspected.

We decided to use X-ray powder diffraction to conclusively identify the specimen. A spindle was prepared from a minute powder sample obtained from an inconspicuous area of the crystal. The

Figure 4. The micaceous habit of the lepidolite crystal is evident in this photomicrograph. Magnified 6 $\times$.

spindle was then mounted in a Debye-Scherrer powder camera and exposed for 4.2 hours to X-rays generated at 48 KV and 18 MA from a copper target tube. The pattern was measured for d spacing with a Nies overlay corrected for film shrinkage. The intensities of the lines were estimated visually. This pattern was then compared with five known lepidolite patterns. It matched the ASTM 14-11 pattern—a two-layered, monoclinic ($2M_2$) structure—almost exactly.

CONCLUSION

Lepidolite cabochons are sometimes encountered by the jeweler, but a large, gemmy crystal such as this is quite rare. Although the crystal examined proved to be a beautiful example of gem-quality lepidolite, the matrix was not genuine. Just as gemologists must cope with synthetic, treated, and

assembled gemstones, they must also sometimes deal with gem mineral specimens with simulated matrix, many of which are not as easy to identify as the one reported here. Some specimens may show virtually no evidence of assembly or alteration. In these cases, subtle signs such as inconsistencies in matrix texture or color are often useful clues. Readers interested in additional information are referred to an excellent paper on mineral chicanery written by Dunn, Bentley, and Wilson (1981).

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