Figure 10. These 29 bangles were submitted to NGDTC by a wholesaler as jadeite jade. The bangles in the left column are slightly finer and of better color. Photo by Li Jianjun.

Figure 11. Two groups of minerals were observed on the surface of this sample under brightfield illumination. One group is composed of the pale whitish subhedral to euhedral grains, the other of the creamy minerals in between. Photomicrograph by Li Jianjun; magnified 30×.

be possible for titanium to pair with divalent iron, and this would prevent the formation of blue color.

These are the first examples of prismatic blue and colorless dumortierite inclusions in rock crystal quartz we have encountered.

Nathan Renfro, Ziyin Sun, and John Koivula

Jadeite with high albite content. With high prices and demand from Chinese consumers for jadeite jade (or *fei cui*), correctly identifying samples is a major challenge for gemological laboratories. Jadeite's complex mineral composition and its nature as a rock rather than a mineral further complicate this problem. While jadeite is the main mineral in jadeite jade, other pyroxene minerals such as kosmochlor, omphacite, amphibole-group minerals, plagioclase (especially albite), and even some iron oxides may also be present. Recently, the National Gold & Diamond Testing Center (NGDTC) lab tested 29 bangles submitted as jadeite jade (figure 10). The results again raised the issue of nomenclature.

The samples could be separated into two groups, one group with finer texture and color (shown on the left in figure 10). Standard gemological tests were applied to all of the samples, and the surface features were observed using a standard gemological microscope. The samples showed the characteristic 437 nm line with a handheld spectroscope. Ten randomly chosen spot RI readings were recorded on each bangle, and the results offered interesting insights. Two different readings of 1.52 and 1.66 were observed, indicating the presence of two major components. The SG ranged from 2.99 to 3.34, while the referenced SG for jadeite jade is 3.34 (+0.06,–0.09). The low SG indicates a significant amount of light minerals in these samples. Another observation was that the group of lesser luster and color (shown on the right in figure 10) tended to have lower SG than the higher-quality samples. Overall, most of the samples were inert to UV, though six showed weak to moderate unevenly distributed bluish fluorescence. Under 30× magnification and brightfield illumination, two major mineral groups with contrasting color, crystal shape, and luster were revealed (figure 11).

Transmission infrared spectra collected from the positions that fluoresced weakly to moderately showed no polymer-related features. To confirm the composition of the two major minerals, we collected micro-infrared reflectance spectra from them (figure 12). The spectrum of the pale whitish mineral indicated jadeite, with the presence of the featured 1050 and 744 cm^{-1} bands in addition to the four bands between 400 and 600 cm^{-1}. The IR spectrum of the creamy mineral matched that of albite, with the characteristic peak at 1040 cm^{-1} band assigned to the Si-O stretching vibration in the SiO_4 tetrahedral structure. The multiple peaks in the 800–700 cm^{-1} region can also help to distinguish albite from jadeite.

The spot RI readings around 1.52 were consistent with albite's published RI of 1.528–1.542. The SG of albite is 2.60–2.65, considerably lower than that of jadeite. The presence of albite as a major mineral component in this material could account for the much lower SG in most of the samples. Although albite is one of the common minerals in jadeite jade, the amount is usually very minor and cannot be easily detected by standard gemological tests. Because the lab could not destroy the samples, no quantitative data were achieved.

Identifying these materials is not easy, especially when the concentration of certain components cannot be quantitatively determined and there is no trade standard on the boundaries for the different varieties. This study serves as a reminder that in addition to the omphacite issue, the high concentration of albite in some goods is a potential problem

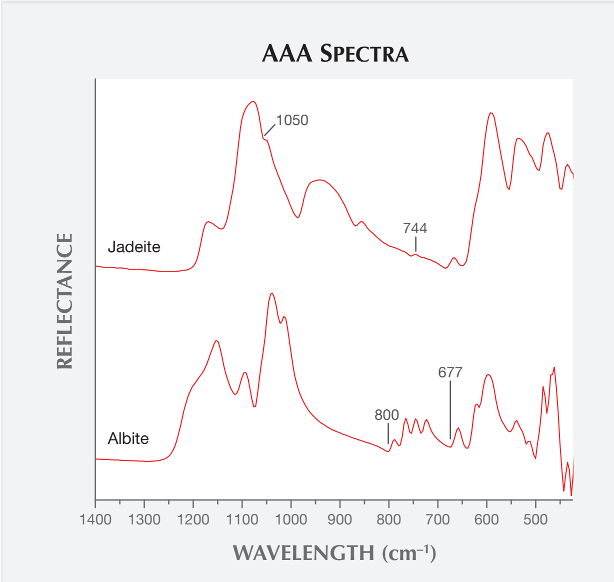

Figure 12. IR reflectance spectra collected from the two main minerals in the samples identified one as jadeite and the other one as albite.

facing laboratories. To better protect consumers, the NGDTC recommends a clear statement regarding the presence of albite on laboratory reports once the albite is identified by the standard gemological test especially according to refractive index, even by the FTIR spectrometer.

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Moldavites: natural or fake? Tectites are members of a large group of impact glasses, formed by the collision of a meteorite on the Earth's surface and the subsequent melting of surrounding rocks. The most famous tectites used as gemstones are moldavites from southern Bohemia in the Czech Republic. These were formed by a meteorite's impact in the Ries crater in southern Germany 14.7 million years ago, about 500 km from their occurrence (V. Bouška, *Moldavites: The Czech Tektites*, Stylizace, Prague, 1994). Moldavites are popular for their pleasant green color, enigmatic origin, and interesting etched texture. They are used in jewelry, in either faceted or natural form. The price of moldavite has risen in the last few years, and as a logical consequence imitations have become more widespread.

In fact, moldavite imitations are nothing new. Faceted moldavites were very popular in Czech jewelry during the second half of the 19th century, often with Czech garnets (chrome pyropes) or small river pearls. Their use diminished in the beginning of the 20th century when imitations made from green bottle glass began to appear. Nevertheless, the author's recent study of five moldavite sets

Figure 13. Glass in a silver brooch, hallmark from 1866. Private collection, photo by Jaroslav Hyršl.

(bracelet, brooch, and earrings) from the second half of the 19th century in the collection of the Museum of Decorative Arts in Prague revealed an unexpected result. Only one set contained moldavites—a donation to the museum by Olga Havlova, the first wife of Vaclav Havel, the late Czech author and statesman. All of the stones in the other four sets proved to be glass imitations. This means that glass imitations have been around decades longer than previously thought (figure 13).

Fortunately, the identification of faceted moldavite is simple. Besides their flow texture and abundant bubbles (almost always much more abundant than in an artificial glass), moldavites contain "wires" of lechatelierite, a high-temperature form of SiO_2. Lechatelierite is very easy to see with a loupe due to its lower RI.

The identification of moldavite with a natural-looking surface is much more difficult. Rumors of moldavite imitations from China have been circulating among Czech dealers for many years, but only recently has the author been able to study some examples (see figure 14). Two large moldavite imitations were seen in a high-end jewelry shop in Hanoi during the 2013 International Gemmological

Figure 14. Two moldavites from southern Bohemia, Czech Republic (top row) and two recent imitations from China (bottom row). The natural specimen on the top right measures 44 mm across. Photo by Jaroslav Hyršl.