



## THE JADEITE/OMPHACITE NOMENCLATURE QUESTION

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Omphacite and jadeite have long been considered easily separated with standard gemological testing (Deer, Howie, and Zussman, 1974). Omphacite has typically been thought of as a dark green to black material with higher optical properties. However, a recent chain of events at GIA's Carlsbad laboratory caused us to question this belief. This short note is meant to describe the situation, the efforts we are making to understand it more thoroughly, and the laboratory's current policy concerning these stones. A comprehensive article is being prepared for publication later this year.

### The Materials

Jadeite and omphacite are members of a large group of rock-forming minerals called *pyroxenes*. These minerals form what mineralogists refer to as a *solid-solution series*. Members of the series, while all related to one another, are actually different minerals based on changes in chemistry and/or structure. In this case, jadeite's chemical formula is  $\text{NaAlSi}_2\text{O}_6$ , while omphacite's is  $(\text{Ca},\text{Na})(\text{Mg},\text{Fe}^{2+},\text{Al})\text{Si}_2\text{O}_6$ . What this means is that sometimes the borders between members can become indistinct—not from a mineralogical point of view, but from a practical perspective.

### The Situation

This study began with a green cabochon in a piece of jewelry submitted to the Carlsbad laboratory in early 2012. The stone's identity was questioned by a staff gemologist, even though it tested gemologically as jadeite (1.66 RI, chrome lines, and a 437 nm line in the

desk-model spectroscope), because the structure looked slightly different than normal, with a somewhat more granular appearance. To those of us with many years of experience, the difference was not noteworthy, as we know the structure of jadeite can vary somewhat in its appearance. However, the staff gemologist, who did not have this preconception, collected a Raman spectrum of the stone to confirm its identification. To our surprise, the Raman spectrum did not match jadeite. It was, however, a very good match for omphacite, according to reference spectra from the [RRUFF database](#). These reference spectra can be considered very reliable, as the identity of each RRUFF specimen is confirmed by X-ray diffraction analysis. Chemical analysis by EDXRF also supported our finding.



*The stones in these earrings have the appearance, color, and gemological properties of fine-quality jadeite. However, Raman analysis showed they were actually omphacite.*

This result caused us to wonder how many stones that look like jadeite and test as jadeite are actually omphacite. We started collecting Raman spectra on every piece of jade that came through the lab and found that while most pieces were indeed jadeite, a surprising number were omphacite. The more we looked, the more interesting our observations became. Pieces whose gemological properties were absolutely identical to jadeite—appearance, color, texture, RI, SG, and absorption spectra—were identified as omphacite by their Raman spectra. Even some fine-quality pieces with the appearance and characteristics of Burmese jadeite fell into this category.

This left us with the question: What do we call these stones? A gemologist using standard testing methods cannot separate them. We are conducting research to find out if this occurrence is the result of new material being found or if it dates back much further, perhaps even to when jadeite was first described more than a century ago (Damour, 1863).

### What Now?

All stones coming through the lab that appear to be jadeite are being tested with Raman spectroscopy and other methods. As stated earlier, much more data and research into this issue are forthcoming. We recognize the importance of this subject and the potential impact on a very large market. At the same time, it is important to address how such stones will be handled on our reports.

At the moment, we see three options:

1. Call these stones *omphacite*, according to their mineralogical name.
2. Expand the “gemological” definition of *jadeite* to include pyroxene that tests as jadeite using standard gemological techniques. This would solve the problem most gemologists would have in not being able to separate these stones without submitting them to a laboratory, but the nomenclature would be

inconsistent with their mineralogy.

3. Expand the term *jade* to encompass more minerals than just jadeite and nephrite, including those stones that test gemologically as jadeite but are actually omphacite. Such stones would be called *omphacite jade*.

There is precedent for the third option (e.g., Adamo et al., 2006). In addition, Chinese gemologists have argued that omphacite, as well as kosmochlor (another pyroxene), should be included with jadeite in the definition of *Fei Cui*, a traditional Chinese term for jadeite jade (e.g., Ou Yang, 2006).

GIA’s laboratories are embracing the third option, and our reports now refer to omphacite that has the gemological properties and appearance of jadeite as *omphacite jade*. This seems to be the most reasonable course of action, and we believe the forthcoming research will support this decision.

To be clear, the laboratory will only use the term “omphacite jade” for *green* material that fits the above mentioned criteria. Using this term for other colors of omphacite is not being considered at this time.

### References

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