

# New Inclusions in Pakistani Peridot: Vonsenite - Ludwigite Needles

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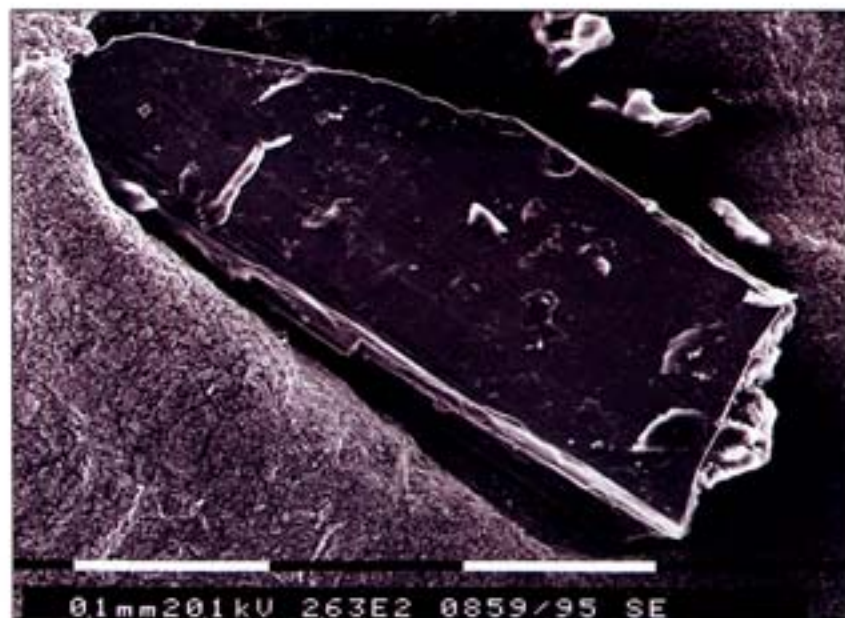
A new type of commercially important Peridot has been appearing in the international market recently. They are found in the Nanga Parbat area of Suppatt, which is situated in northern Pakistan, within the Himalayan mountains. The Peridots are characterized by their large sizes, high clarity and good color. The deposits can therefore be considered an important new source comparable to those of the classic mine at Pyaunggaung in Burma. The Peridots of Pakistan may easily be identified and separated from Burmese Peridots by a new type of acicular and black inclusion as shown in **Figure 1**, which are not found in Burmese Peridots.

This new type of inclusion was analyzed in more detail by means of x-ray analyses (Gandolfi Camera), electron microscope analyses in conjunction with an EDS-system (semi-quantitative chemical information). In this way, combining the two methods, the inclusions could be determined definitively.

A portion of a needle-like black inclusion, which was analyzed by the Gandolfi method, is shown in **Figure 2**. It was separated from an approximately 60 carat rough Pakistani Peridot. Another rough Peridot was polished at a level flush with inclusions so that they were exposed at the surface for electron microscope and chemical analyses. The data obtained of the crystal structure analyses are shown in **Figure 3**. The data indicates that the black needles belong to the Vonsenite-Ludwigite series



**Figure 1:** Microphotograph of black spiky needles occurring in a large Peridot from Suppatt, Pakistan, magnification on original slide 25x. Identification as Vonsenite-Ludwigite needed chemical and crystal structure analyses of the inclusions.



**Figure 2:** Crystal separated and analyzed for x-ray diffraction and chemical analyses. SEM-image (SEM Laboratory, University of Basel.) Crystal diameter is 0.2 mm.

