

Raman spectroscopy of lonsdaleite and diamond from Kumdykol deposit (Kazakhstan)

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Natural monocrystalline lonsdaleite was found by TEM study of carbon mineralization from Kumdykol diamond deposit (Shumilova et al., 2011). Here we present the results of our study of these specimens by Raman spectroscopy.

Longitudinal sizes of analyzed particles were about 1-5 μm . Spectroscopic study of the samples was carried out with a high resolution Raman spectrometer LabRam HR800 (Horiba, Jobin Yvon) at room temperature. Spectra registration was performed using a spectrometer grating of 1800 g/mm, with a confocal hole size of 300 μm , slit of 100 μm , and 1–10 mW exciting radiation power of a Ar^+ laser ($\lambda = 514 \text{ nm}$).

Recorded spectra for further mathematical processing have been decomposed into components by LabSpec 5.36 software with curve fitting procedure by the combination of Gaussian and Lorentzian functions. Analysis of positions and half-widths of Raman bands in the region of 1300-1340 cm^{-1} allowed us to declare the presence of several phases in the specimens with the characteristic properties to lonsdaleite, lonsdaleite and diamond, diamond and nanocrystalline diamond. The figure shows one of the Raman spectra, which features bands (the first – 1319 cm^{-1} , FWHM = 5.7 cm^{-1} , the second – 1322.4 cm^{-1} , FWHM = 4.5 cm^{-1}) correspond to lonsdaleite phase. According to Wu (Wu, 2007) the bands 1319.4 and 1322.4 cm^{-1} can correspond to E_{1g} and A_{1g} Raman modes respectively.

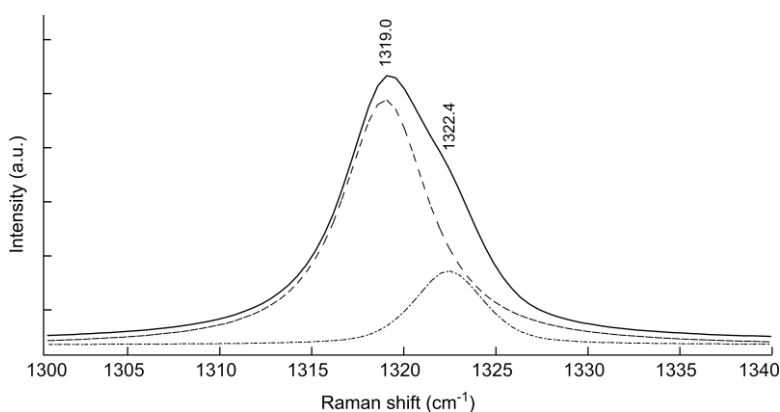


Figure. Raman spectra of lonsdaleite from Kumdykol deposit (Kazakhstan). Solid line – Raman spectrum, dotted lines – the result of the spectrum decomposition by a Gaussian-Lorentz function.

References:

Wu B. R, *Diamond & Related Materials* 16 (2007) 21–28.

Shumilova T. G., Mayer J., Isaenko S. I., *Doklady Earth Sciences* (in press).