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Raman spectroscopic and microscopic criteria for the distinction of microdiamonds in ultrahigh-pressure metamorphic rocks from diamonds in sample preparation materials

Maria Perraki,[1,*] Andrey V. Korsakov,[2] David C. Smith,[3] and Evripidis Mposkos[1]

[1]School of Mining and Metallurgical Engineering, National Technical University of Athens, 9 Heroon Politechniou St., GR-15773, Zografou, Athens, Greece
[2]Institute of Geology and Mineralogy, Siberian Branch of the Russian Academy of Sciences, Koptyug Pr. 3, Novosibirsk 630090, Russia
[3]Laboratory of Extraterrestrial Materials and Nanoanalysis, Muséum National d'Histoire Naturelle, 61 Rue Buffon, 75005 Paris, France

Abstract

Natural diamond from three ultrahigh-pressure metamorphic (UHPM) terranes (Erzgebirge Massif, Germany; Kokchetav Massif, Northern Kazakhstan; Rhodope Metamorphic Province, Greece) and synthetic diamond from cutting and polishing materials (paste, spray, saw blade) were studied by means of optical microscopy and Raman microspectroscopy, to constitute a new petrographic and spectroscopic data set that might be a useful tool for identifying and characterizing metamorphic diamond. Several criteria are established for distinguishing natural microdiamond identified in a rock thin section from the externally introduced ones [i.e., diamond as residual particles (contaminants) from the cutting and polishing material] such as the diamond size, the presence of inclusions, coatings, or coexistent phases and two diamond Raman band parameters, i.e., the Raman shift and the full-width at half maximum height (FWHM).

Keywords: Diamond, Raman, UHP metamorphism, Kokchetav, Erzgebirge, Rhodope Metamorphic Province