ABSTRACT

Five natural faceted diamond samples, weighing between 0.75-1.35 carats, considered to have inherent submicroscopic and nanometric inclusions were studied using spectroscopic and microscopic techniques such as Raman spectroscopy, Raman microscopy, scanning electron microscopy (SEM) and energy dispersive analysis of X-rays (EDAX). As a confirmative tool, laser desorption ionization mass spectrometry (LDI MS) was used for the characterization of the inclusions. Our study suggests that the inclusions in diamond belong to the pyroxene group of silicate minerals with Fe, Mg, Ca, Ru, and Cr as the major elements. As evidenced by the absence of alkali, aluminium, and rare earth elements in the inclusion, the diamond can be of peridotitic origin. We found that chromium scavenges Ru, a platinum group element (PGE), and other metals such as Nb, Co, and Ni, entrained into the pyroxene inclusions. We established that the diamond sample in which inclusions are found is of Kimberlitic origin, and the inclusions in the diamond are the vestiges or part of the exhumed raw material of pyroxene.

KEYWORDS

Diamond, Raman spectroscopy, SEM/EDAX, MALDI MS, Inclusions Peridotite, Lamproite - Eclogite, Platinum group elements, Pyroxene.