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FTIR Spectroscopy Data and Carbon Isotope Characteristics of the Ophiolite-hosted Diamonds

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Abstract

We report new $\delta^{13}C$ -values data and N-content and N-aggregation state values for microdiamonds recovered from peridotites and chromitites of the Luobusa ophiolite (Tibet) and chromitites of the Ray-Iz ophiolite in the Polar Urals (Russia). All analyzed microdiamonds contain significant nitrogen contents (from 108 up to 589 ± 20% atomic ppm) with a consistently low aggregation state, show identical IR spectra dominated by strong absorption between 1130 cm^{-1} and 1344 cm^{-1}, and hence characterize Type Ib diamond. Microdiamonds from the Luobusa peridotites have $\delta^{13}C$ -PDB-values ranging from -28.7‰ to -16.9‰, and N-contents from 151 to 589 atomic ppm. The $\delta^{13}C$ and N-content values for diamonds from the Luobusa chromitites are -29‰ to -15.5‰ and 152 to 428 atomic ppm, respectively. Microdiamonds from the Ray-Iz chromitites show values varying from -27.6 ‰ to -21.6 ‰ in $\delta^{13}C$ and from 108 to 499 atomic ppm in N. The carbon isotopes values bear similar features with previously analyzed metamorphic diamonds from other worldwide localities, but the samples are characterized by lower N-contents. In every respect, they are different from diamonds occurring in kimberlites and impact craters. Our samples also differ from the few synthetic diamonds; we also analyzed showing enhanced $\delta^{13}C$ -variability and less advanced aggregation state than synthetic diamonds. Our newly obtained N-aggregation state and N-content data are consistent with diamond formation over a narrow and rather cold temperature range (i.e. <950°C), and in a short residence time (i.e. within several million years) at high temperatures in the deep mantle.

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