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OPTICAL STUDIES OF FLUIDS IN FIBROUS DIAMONDS

Shiryaev, A.[1,2] & Zedgenizov, D.[3]

[1] Institute of crystallography RAS, Leninsky Pr. 59, 119333, Moscow, Russia
[2] BGI, Universitatstr. 30, D-95448, Bayreuth, Germany
[3] Institute of Mineralogy and Petrology, Novosibirsk, Russia
e-mail: andrej.shiryaev@uni-bayreuth.de

Fibrous diamonds can provide unique information about fluids from upper mantle and contribute to our understanding of diamond growth conditions. In the course of this study we applied several complementary local techniques for a comprehensive study of microinclusion chemistry and phase composition as well as distribution of carbon and nitrogen isotopes within samples cross section. This approach permitted to monitor the evolution and changes of fluids and isotopes during different growth steps. In this presentation we will discuss results of microscopic IR measurements performed on these samples. Similarly to previous investigations of fibrous diamonds (e.g., CHARETTE, 1966; CHRENKO et al., 1967; GALIMOV et al., 1979) we observe numerous infra-red (IR) absorption bands due to micro-inclusions. It is interesting to note that the mineral species in fibrous diamonds from different world deposits (Africa, Canada, Yakutia, Brasil) are broadly similar: Phosphates (e.g., apatite), carbonates (probably ankerite), and silicates are among the most common minerals. Shift of quartz and CO_2 absorption bands indicates that the inclusions are under confining pressure in the range 1.5-2.5 GPa. A common feature for IR spectra of many fibrous diamonds is the absorption ascribed to silicate melt phase (around 1000 and 1100 cm^{-1}).

In some stones point-by-point spectroscopic investigations (Fig. 1) clearly indicate some compositional evolution of growth medium, which is often supported by chemical and isotopic analysis. It is notable that in some cases the evolution could be observed even within single growth zone as revealed by CL.

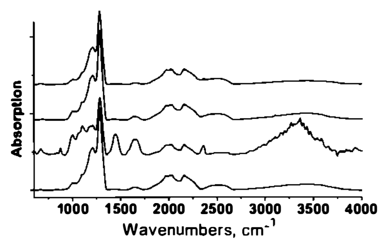

Fig. 1. IR spectra of fibrous diamonds

A remarkable feature of fibrous diamonds is that microinclusions also contain different water solutions and CO_2. In many spectra several lines in the region of OH valence vibrations are observed, indicating that minerals in inclusions contain OH groups. Possibly some of the observed lines are related to OH-groups in talc and/or serpentine. IR measurements at different temperatures will be reported. This work will give more reliable information about chemical and phase composition of microinclusions.

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References

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