

Features of eclogitic garnet diagnosis with IR-Fourier spectroscopy method: applications for kimberlite exploration

G. K. Khachatryan, T. E. Shcherbakova, and T. I. Kolesnikova

Central Research Institute of Geological Prospecting for Base and Precious Metals, Moscow, Russia
(kolesnikova2456@mail.ru)

Purpose of the investigation – creating and using an express technique to distinguish among varieties of pyrope-almandine-spessartine garnets (IMK) in individual grains from stream sediment samples.

30 reference garnet grains previously analyzed by means of the Roentgen-spectrum microanalyzer were used as the objects of examination. The spectra were registered using the Nicolet 380 device with a THERMO Scientific Centaurus microscope in wave range of 650-4000 cm^{-1} .

In the range of 800-1000 cm^{-1} , "monocrystal" spectra of all garnets have a double maximum of absorption with characteristic frequencies ν_1 (870-942 cm^{-1}) and ν_2 (826-884 cm^{-1}). These parameters consistently decrease in the pyrope-almandine-spessartine row in the inverse relationship from the ionic radiuses of the bivalent cations (Mg, Fe, Mn). Correlation of the ν_1 and ν_2 values for pyralspite garnets has a linear character. Chromic pyropes, i.e. pyrope-knorringite garnets, are separated into an independent branch as they differ from almandines and almandine-spessartines by their ν_1 and ν_2 value ratio.

The technique is applicable for diamond deposit prospecting using the mineral concentrate method. This technique helps to distinguish visually similar yellow-orange and orange-red pyropes and pyrope-almandines in stream sediment samples from the dispersion halos associated with kimberlite bodies from similar colored metamorphic garnets.