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Crystal-chemical features of natural olivines based on luminescence data

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Abstract

The photoluminescence and excitation spectra of natural olivines from dunites and harzburgites in Ural Alpine-type hyperbasites have been examined. Emission bands have been observed from SiO4 3- centers (420, 440, and 470 nm) and AlO4 4- centers (460 nm), whose excitation spectra have been recorded. The luminescence is not of recombination type but occurs within centers. Energy-level schemes and electronic transitions are indicated as responsible for the absorption and luminescence in the hole centers. The weak luminescence bands at 630 and 700 nm are assigned correspondingly to Mn2+ in octahedra and Fe3+ in tetrahedra. This is confirmed by the agreement between the excitation spectra and the theoretically calculated energy levels of these ions.