

## Major and trace element composition of olivine from magnesian skarns and silicate marbles

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### ABSTRACT

Olivine is a major rock-forming mineral in various magmatic and metamorphic rocks and the upper mantle. In this paper, we present the first high-precision analyses of olivine from 15 samples of magnesian skarns and silicate marbles (MSSM) from the collection of the Fersman Mineralogical Museum (Moscow, Russia). Mg# [ $\text{Mg}/(\text{Mg}+\text{Fe}^{2+}) \cdot 100$ , mol%] of olivine from the samples studied varies from 86 to nearly 100. The main distinctive features of the olivine are anomalously low contents of Co (<5  $\mu\text{g/g}$ ), Cr (<5  $\mu\text{g/g}$ ), and Ni (<44  $\mu\text{g/g}$ ) and high content of B (23–856  $\mu\text{g/g}$ ), which correlate with host-rock compositions. Phosphorus (5–377  $\mu\text{g/g}$ ) incorporation in olivine is charge balanced by the incorporation of Li (0.15–61  $\mu\text{g/g}$ ) and Na (<14.3  $\mu\text{g/g}$ ). Y and REE contents exhibit positive correlations with Na, which suggests that REE incorporation into MSSM olivine could occur via charge-balanced coupled substitution with Na at low temperature and low  $a_{\text{SiO}_2}$  conditions during MSSM formation. The documented compositional features of olivine from magnesian skarns and silicate marbles can help reconstruct the genesis of the host-rocks and identify xenocrysts of MSSM olivine in magmatic rocks.

**Keywords:** Olivine, LA-ICP-MS, magnesian skarn, silicate marble, contact metamorphism