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SPINEL GEOTHERMOMETRY IN THE METASOMATIC CHROMITITES OF THE FINERO MANTLE MASSIF, IVREA ZONE (WESTERN ITALIAN ALPS)

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The Finero phlogopite peridotite is the largest and the northernmost of three mantle massifs exposed at the base of the lower continental crust in the Ivrea Zone (Western Alps, Italy). It consists of a depleted harzburgite affected by alkaline metasomatism (ZACCARINI et al., 2004) that caused the precipitation of abundant phlogopite. Small bodies of podiform chromitite occurring within the phlogopite peridotite are believed to represent by-products of the metasomatic process. Physical conditions (T°C- fO_2) of chromitite precipitation have been estimated using the T-M site Mg-Al distribution, based on X-ray single crystal diffraction, and application of the spinel-olivine thermobarometer of BALLHAUS et al. (1991). The analysed chromite has a_0 ranging from 8.2755 to 8.3011 Å and an oxygen positional parameter variable between 0.26243 to 0.26269. The application of the thermometer proposed by PRINCIVALLE et al. (1999) gave intracrystalline temperatures in the range of 800-1100 °C. The results of olivine-spinel Fe-Mg exchange thermometry and oxygen fugacity calculations, calculated for an assumed pressure of 1.0 GPa, are compatible with the spinel-peridotite facies of the Finero mantle and show that the massive chromitite equilibrated in a relatively narrow oxygen fugacity, close to that of the FMQ buffer and in a thermal interval between 1150-750 °C. These temperatures are fully consistent with those obtained using the PRINCIVALLE et al. (1999) thermometer. The estimated temperature range (750-1150 °C) extends to temperatures too low to represent the temperature of magmatic crystallization of chromite. However, temperatures are well consistent with slow-cooling spinel re-equilibration during the metasomatic episode affecting the Finero Complex. The oxygen fugacity values obtained for massive chromite are consistent with upper mantle conditions, although ZACCARINI et al. (2004) have shown that reducing conditions (down to $\Delta \log fO_2 = -7$) are achieved during the final stages of metasomatism, as deduced from spinel-symplectite formed at temperatures of about 600 °C.

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