POLYTYPISM, ORDER/DISORDER AND THERMOELASTIC PROPERTIES OF PHENGITES: SOME IDEAS FOR METAMORPHIC PETROLOGY

FERRARIS G., PAVESE A. and PISCHEDDA V.

Polytypism, order/disorder and thermoelastic properties of phengites: some ideas for metamorphic petrology1FERRARIS G., 2PAVESE A. and 1PISCHEDDA V. - 1Dpt. Sci. Mineral. Petrol. Univ. Torino, Italy; 2Dpt. Sci. Terra Univ. Milano, Italy Muscovite with celadonitic substitution (i.e., Mg for octahedral Al and Si for tetrahedral Al) is known with the name phengite. Phengitic composition occurs typically (even if not only) in HP metamorphic ambient and is used for geobarometry. However, besides chemistry, structural aspects must be considered for a correct identification of micas: two polytypes (3T and 2M1) widely occur with phengitic composition and they can have different degrees of order for cations. Field observations show that type of polytype and degree of order might be a function of p/T. Diffraction experiments performed by neutron and synchrotron radiation under a wide range of p and T, compared with data in literature, have shown that:1. as a consequence of different symmetry constraints, the degrees of freedom for ordering are higher in 3T than 2M1;2. tetrahedral and octahedral order is present in a wide range of temperature for the 3T we examined, while the studied 2M1 shows disorder at room temperature and order at HT;3. expansion and compression parameters depend from the composition and type of polytype. These results support the existence of different fields of stability for phengites both as a function of composition and of polytypic state. In particular, results 1. and 2. support the hypothesis given in literature that on decreasing p/T a transition from ordered 3T to disordered 2M1 can occur.