ABSTRACT

series of scientific articles "Crystal chemistry of a transitions metals minerals, as a basis for geological reconstruction and creation of new materials",

presented at the Competition of Prizes for Scientific Works of St. Petersburg State University

The cycle of papers submitted for the competition includes 12 articles and is devoted to experimental and theoretical studies of a number of transition metal (including lanthanides) minerals, as well as their synthetic analogues. It is shown that detailed mineralogical and crystallographic studies can be the basis for the formation of new search criteria for a number of deposits (based on composition-formation conditions relationships) and provide unique data for designing new mineral-like materials (based on composition-structure-properties relationships).

The typomorphic features of minerals and the possibility of their use in geological reconstructions are considered in 9 works. The basis for this block of studies was data on natural samples from various deposits in Russia, Brazil, Tanzania and Vietnam, as well as information on synthesized analogues of minerals. Data on the content of lanthanides in iron-manganese nodules of the Kara Sea and manganese ores of the Ushkatyn-III deposit allow us to take a fresh look at the conditions for the formation of the largest manganese deposits in the world. The geological conditions of occurrence and the obtained experimental data on the stability of tourmalines enriched in lanthanides (La, Ce, Nd, Yb) and transition metals of the first series (Fe, Mn, Cr, Ni, Cu) have found their application in reconstructing the conditions for the formation of a wide range of geological objects and were used to determine the sources rocks for the Siberian craton formation.

Data on the physical properties of minerals, synthetic analogues of which are used in industry, are given in three articles. The results obtained can form the basis for the creation of new linear pyroelectrics (based on tourmaline) and improve the hydrogen evolution reaction method (based on new data on natural phosphides).