Geophysical Research Abstracts, Vol. 7, 01752, 2005
SRef-ID: 1607-7962/gra/EGU05-A-01752

Nanostructures of oxide manganous aggregates

G.N. Lysiuk

Institute of Geology, Ural Division Russian Academy of Sciences (cryst@geo.komisc.ru)

Manganous oxide is one of the most widespread and practically important objects, in formation and transformation of which microorganisms play an active role. Manganous oxide is characterized by the joint presence of both well crystallize modifications, and fine phases with the lowest order strength (with the contents of roehtgenoamorphous component till 50 - 60% at significant concentration of ore component). This fact till now has no enough strict scientific explanation. We examined formation of roehtgenoamorphous nano-dimensional manganous oxide from positions of biogenic mineral formation. Objects of our researches were nano-dimensional phases of the oceanic ferromangsnous nodules. Electronic-microscopic investigations showed a great expansion of mineralized biofilms on the studied samples. The content of the bacterial mass make (%): MnO ąV 28.34; Fe2O3 ąV 17.14; SiO2 ąV 7.11; CaO ąV 2.41; TiO2 ąV 1.90; Na2O ąV 1.74; Al2O3 ąV 1.73; MgO ąV 1.30; P2O5 ąV 1.25; SO3 ąV 1.25; CoO ąV 0.68; CuO ąV 0.54; NiO ąV 0.53; K2O ąV 0.50. Another development of a bacteria factor during formation of manganous oxide is occurrence of fossilized cyanobacterial mat with the content (%): MnO ąV 48.35; Fe2O3 ąV 6.23; MgO ąV 8.76; Al2O3 ąV 5.05; SiO2 ąV 4.45; NiO ąV 3.63; Na2O ąV 2.30; CuO ąV 2.19; CaO ąV 1.31; K2O ąV 0.68. The use atomic-force microscopy method allows determining size of some cells of cyanobacteria with the 200nm at length and about 70nm across diameter. Electronic- microscopic investigations showed that the phase data is a mineralized glycocalix, composed of nanodimensional flakes of todorokite. Inclusions of native metals (copper, iron, zinc) with the size from 10 to 20 ČÝn were found in the ore areas of ferromanganese nodules. Formation of the native metals can be explained by an accumulation of organic matter as a result of formation of microscopic areas with abrupt recovery conditions.