MAGNETISM OF MAGNETITE UNDER HYDROSTATIC PRESSURE

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Studies of pressure impact on magnetocrystalline anisotropy and axis switching phenomenon in single crystalline Zn-doped magnetite are presented. In the Verwey phase transition at temperature $T_V \approx 124$ K, magnetite crystal structure changes from cubic $Fd\bar{3}m$ to monoclinic Cc, and this is linked to the change in magnetocrystalline anisotropy with easy axis along one of the <100> cubic directions. The unique easy axis, and simultaneously also monoclinic c axis, can be established by application of external magnetic field while cooling the sample below T_V, but can also be switched to the other <100> direction by magnetic field („axis switching" - AS). Activation energy of AS is of the same order as $k_B T_V$, what suggests common origin of both phenomena. Since pressure lowers transition temperature, it was interesting to check if activation energy follows this trend in stoichiometric and zinc doped magnetite. It has been found that activation energy of AS increases with pressure in all cases, contrary to the decrease of $k_B T_V$. The diversion of easy axis from [100] under pressure of 1.2 GPa was found. The pressure induced structure transition from inverse to normal spinel, which was reported recently, was not observed.

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