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Peculiarities gypsum crystals structure based on electron paramagnetic resonance radiation defects

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Abstract

© SGEM2016. Electron paramagnetic resonance (EPR) at 77 K in the X-band are studied natural gypsum crystals ("Marino" glass, Russia), previously irradiated at room temperature by X-rays of different doses. Detected earlier observed spectra of paramagnetic centers SO-3(B); SO-3(A1); SO-3(A2)[Crystallog. Rep., vol. 59(3), pp.399-406. 2014]. It was found two new spectrum with magnetic multiplicity $KM = 2$ (C_i symmetry center) and super hyperfine splitting of the interaction of the electron spin $S = 1/2$ and the proton nuclear spin $I = 1/2$. These spectra are assigned to the centers SO-4—1H, which differ from each other in the position of a proton H(1) gypsum structure. The mobility of water molecules in the channels of the structure activates the formation of two or more centers SO-4—1H, SO-3—1H. From the angular dependence of the spectra in the three orthogonal planes were found the parameters of the spin Hamiltonian (SH). It has been established that the differences in radiation sensitivity of the paramagnetic centers depends on charge redistribution processes in the crystal.

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Keywords

Crystal structure, EPR, Gypsum, Radiation defect, Water molecular