

AFM investigation of thin Fe_2O_3 films crystallization

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The present work is focused on the studies of new thin-film materials with unusual crystalline structures formed by crystallisation in amorphous films. The structure of thin amorphous films of Fe_2O_3 produced by oxidation pyrolysis of $\text{Fe}(\text{CO})_5$ at 170^0 C and different gas phase oxygen concentrations was studied by electron diffractometry and electron diffraction techniques. It was found generation of spherulite $\alpha\text{-Fe}_2\text{O}_3$ with unusual structure. Now AFM tapping mode has been used to study the surface morphology of thin amorphous Fe_2O_3 films and crystalline defects direct generated in process of generation of amorphous films. AFM investigations were carried out in air in tapping mode with the microscope P47-SPM-MDT (Russia, NT-MDT) and Si cantilevers NSC11 (Estonia, Mikromasch).

AFM images of amorphous film Fe_2O_3 surface are presented in fig. 1a. Globular microstructure of amorphous film is come out. Roughness parameters is: peak to peak value $S_Y = 60,42 \text{ nm}$, RMS $S_q=8,44 \text{ nm}^2$. Defects of crystal phase in amorphous film have morphological shape of spherulite. Part of crystal structure is presented in fig. 1b. Together with change of surface morphology constitutive change of roughness parameters $S_Y = 22,02 \text{ nm}$, RMS $S_q=3,50 \text{ nm}^2$ is found. In this work AFM and TEM data are collate and analysis of spherulite is made.

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