Abstract Submitted
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Investigation of the Magnetic Properties of Ni-implanted ITO Thin Films[1] FIGEN AY, BEKIR AKTAS, Gebze Technical University, Department of Physics, RUSTEM KHAIBULLIN, VLADIMIR NUZHDIN, Kazan Physical-Technical Institute of RAS, BULAT RAMEEV, Gebze Technical University, Department of Physics;Kazan Physical-Technical Institute of RAS — Commercially available ITO thin films on fused silica substrates were implanted with 40 keV Ni^+ ions to fluences of (0.5,1.0&1.5) $\times 10^{17}$ ions/cm^2 at room temperature. XRR measurements show that the thickness of the implanted films ($\sim$ 28.5 nm) does not change noticeably with the fluence, while the surface roughness increases essentially. SEM and EDX studies revealed a highly non-uniform distribution of Ni atoms. Room temperature ferromagnetism was observed in the samples with fluences of (1.0&1.5)$\times 10^{17}$ ions/cm^2. VSM hysteresis curves and FMR signal point to the formation of a ferromagnetic near-surface layer in the implanted films due to agglomeration of closely-spaced metal Ni nanoparticles. The filling factor of the Ni ferromagnetic phase in the granular magnetic layer was estimated from the FMR results. Super- and para- magnetic phases were observed in the temperature dependence of magnetization by VSM. Superparamagnetic phase is attributed to the Ni nanoparticles located in deeper regions near the film/substrate interface, while paramagnetic phase is related to the impurity centers. For the samples with fluences of (1.0&1.5) $\times 10^{17}$ ions/cm^2 average sizes of the superparamagnetic nanoparticles were calculated from the blocking temperatures T_B observed in thermo-magnetic dependences.

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