2D nanoprinting on elastic thin films through self-assembly of magnetic nanoparticles.

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The possibility of programmable self-assembly of single-domain nanoparticles into 2D spatial structures on hydrophobic elastic surfaces has been demonstrated due to potential applications in flexible magnetoelectronics. The appearance of ordered nanostructures on the substrate results from the drying processes of the stable magnetic colloid with a given value of pH. In the experimental part, the magnetic Fe_3O_4 nanoparticles were considered. The density of printed magnetic structures significantly depends on the type of substrate and a kind of stabilizing coating for the magnetic nanoparticles. It can be also controlled by the external magnetic field gradients. In the particular case of a drying spherical drop, multi-ring structures made of magnetic nanoparticles can be obtained with the ability to control the distance between the rings [1]. Other linear dot-like or continuous nanorod magnetic structures are possible. The resulting flexible magnetic films allow the control of magnetic dipole-dipole interaction through their elastic deformation [2].

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