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Ordered magnetic nanohole and antidot arrays prepared through replication from anodic alumina templates

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Highly ordered arrays of Ni nanoholes and $Fe_{20}Ni_{80}$ antidots have been prepared respectively by replica/antireplica processing and sputtering techniques using nanoporous alumina membranes as templates. Geometrical characteristics as nanohole/antidot diameter, interpore distance and the overall hexagonal symmetry of arrays are controlled through the original templates. Experimental data on their hysteresis and magnetic domain structure have been taken by Vibrating Sample Magnetometry and Magnetic Force Microscopy, respectively. An analysis of the magnetization process, resulting magnetic anisotropy and magnetic domain structure is summarized considering the influence of those geometry aspects. In particular, the hexagonal symmetry and the density of nanohole/antidots determine the overall magnetic behavior which is of interest in future high-density magnetic storage systems.