

Preparation of Ferromagnetic Ellipsoidal Co Rings by Capillary Force Lithography

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Generally, small circular disks can acquire the so-called vortex state, in which the magnetic flux is restricted within the magnetic structure. In small supermalloy disks, the transition from vortex state to destabilized (single-domain) state occurs at a few hundred nanometers. The instability problem of the vortex core in a small circular disk can be resolved by removing the central part of the disk. Recently, the attention has moved to the ring structure because of its small dimension, high stability, and high areal density. Those advantages lead to the application in ultrahigh density magnetic recording, magnetoresistive random access memory (MRAM). For this reason, the method to prepare the ferromagnetic Co rings was investigated. First, capillary force lithography was used to prepare ellipsoidal polymer patterns in large area onto pre-deposited Au/Co layer. Then, reactive ion etching flow was injected to remove the residual polymer layer. To fabricate the Co ring structure, the Co layer was selectively etched by Ar ion milling using the polymer layer as mask.