

Nano-Injection Molding Technology for Ultra-High-Density Patterned Magnetic Media

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ABSTRACT

With an increasing demand for ultra-high-density information storages, patterned media have received much attention as a solution to overcome the limits of conventional continuous magnetic media. One of the current methods to fabricate the patterned media is to use direct patterning and etching. However, those procedures are very costly and are not suitable for mass production.

In this presentation, we discuss the fabrication method for ultra high density patterned media developed by nano-injection molding technology using a metallic nano stamper for mass production. First, master patterns in a nanoscale size and pitch were fabricated by electron beam lithography. After a nickel seed layer was deposited on the master patterns, electroforming process was used to make the metallic stamper. The polymeric patterned substrate was replicated by nano-injection molding with the metallic stamper. The replicated patterns were as small as 50 nm in size. For evaluation of the replication quality, a magnetic layer was deposited on the substrate. We finally confirmed that the magnetic islands were successfully formed as a single magnetic domain on the nano-patterned substrate.

Our results show that the nano-injection molding process can be applied to mass production with low cost for high-density patterned media. Realization of ultra-high-density patterned media with tera-byte capacity by nano-injection molding process is the subject of ongoing research.