## EM Simulation for Designing Next Generation Magnetic Recording Systems

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EM simulation impacts many different areas. One of practical and industrial applications is designing magnetic recording systems; higher density and faster recording methods are needed to develop for huge amount of information storage, big data analysis, and so on. In this presentation, we will introduce recent progress of our computational EM studies, especially for technologies using bit patterned media and plasmonic antennas, toward developing next generation magnetic recording systems for higher density and faster recording (Nakagawa et al., *J. Appl. Phys.*, 109, 2011, 07B735-1–07B735-3; Ohnuki et al., *Radio Science*, 49, in press).

The technology using bit patterned media is able to resolve thermal fluctuation by arranging particles regularly. It is useful to achieve high-density magnetic recording, since one-bit information is stored inside each nano-sized particle. We will discuss magnetization reversal process in bit patterned media and the way of arrangement.

Our recent progress toward ultra-fast magnetic recording will also be discussed, i.e. all-optical magnetic recording with circularly polarized light. The recording method was recently discovered (Stanciu et al., *Phys. Rev. Lett.*, 99, 2007, 047601-1 - 047601-4) and it is a promising way for realizing ultra-fast magnetic recording. We have designed a high-density system using plasmonic antennas to localize circularly polarized light beyond diffraction limit and bit patterned media to store one-bit information (Ohnuki et al., *Radio Science*, 49, in press). In this presentation, the generation condition of circularly polarized light will be clarified for practical plasmonic antennas with perturbed surfaces considering nano-fabrication process.