

Magnetization process of square ring with round hole in Permalloy antidot array under various film thicknesses

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The main purpose of this study is to use micromagnetic simulation to understand magnetization reversal characteristics of Permalloy antidot array, which is composed of multiple square rings with round hole. One square ring with round hole is used for the simulation here. The main reason is that the antidot array boundary can't be clearly defined during simulation. We designed this square ring as a square with a side length of 400 nm which is digged out a 200 nm diameter circular hole in the middle of the square; the center of the hole overlaps the center of the square. If this unit expands outwards, it will form an antidot array ; here we only focus on a single unit.

The spin configuration of square ring with different film thicknesses(8nm~64nm) and the reversal characteristics when a magnetic field is applied are investigated. These characteristics are important in spintronics. The software we used to simulate the square ring is OOMMF (Object Oriented MicroMagnetic Framework) which is commonly used in spintronics research, and it can provide the spin configuration and hysteresis curve. Understanding the magnetization process of one square ring is helpful for simulations of large-scale antidot array. The large-scale antidot array can be applied in the field of magneto-optical research in the future.