SOME MAGNETIC PROPERTIES OF ULTRATHIN MAGNETIC DOT ARRAYS

A. Urbaniak-Kucharczyk, I. Łużniak[a] and Fray de Landa Castillo Alvarado[b]

[a]Department of Solid State Physics, University of Łódź,
ul. Pomorska 149/153, 90-236 Łódź, Poland

[b] Escuela Superior de Fisica y Matematicas, Instituto Politechnico National, Edificio 6
UPLAM, Delegado G.A. Madero, 07738 Mexico District Federal, Mexico

9.7 cm

Modern experimental techniques make it possible to fabricate arrays of small magnetic particles of nanometer size and well-defined shape. These structures are interesting not only because of possible applications in magnetoelectronic devices but also from a point of view of their basic properties. In presented work we consider array of magnetic dots of thickness of several monatomic layers. The distance between dots is chosen in such a way that dipolar coupling between them can be neglected. The Heisenberg Hamiltonian consisting of the exchange, single ion anisotropy and Zeeman terms, respectively, is employed to calculate low temperature characteristics of the system. Spin wave profiles and temperature dependence of spontaneous magnetisation is investigated as a function of the dot diameter. In calculation the anisotropy parameters at the edges of the dots have been estimated for the system of Fe dots. It is shown that the spin wave parameter B describing Bloch's law increases in non-linear way with decreasing of the size of the dot. The results obtained are compared with results for continuous layer of the same thickness.

13.4 cm

Subject category :

5. Nano-structure, Surfaces, and Interfaces

Presentation mode :
poster

Corresponding author :
A. Urbaniak-Kucharczyk

Address for correspondence :
Department of Solid State Physics, University of Łódź,
ul. Pomorska 149/153, 90-236 Łódź, Poland

Email address :
aurbaniak@uni.lodz.pl