FERRIMAGNETIC PROPERTIES OF THIN FILM WITH MULTI-DECORATED SURFACES IN SPIN-1/2 ISING MODEL

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Thin ferromagnetic film structure with ferrimagnetically multi-decorated surfaces (molecular based magnets) is considered in an Ising model with $S = 1/2$. The expressions for free energy and layered magnetizations of anisotropic film are obtained using the linear chain approximation (exact solution), transfer matrix method and decoration transformation. The latter introduces the temperature variation of surface exchange interactions. Then, we discuss the surface phase diagrams, magnetization profiles (reversed with temperature) and temperature dependencies of layered magnetizations. In particular, the multi-compensation and critical temperatures are computed for different values of film thickness, magnetic moment of decorating atoms and exchange couplings. The possible existence of multiple reversal of total (or surface) magnetization direction with temperature is presented in a number of phase diagrams. Even, in the case of single-decoration, we observe two-compensation effects induced by film thickness variation.

9.7 cm

13.4 cm

Subject category :

2. Magnetic Films, Surfaces and Multilayers

Presentation mode :
poster

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