Abstract

The magnetization dynamics of one- or two-dimensional self-organized assemblies of interacting nanoclusters, which are potential candidates for ultra-high density magnetic recording media, was investigated using Monte Carlo simulations. The study was focused on the temperature variation of the ac-susceptibility as well as the decay over time of the magnetization of cobalt nanoparticles having the same anisotropy axis. Evidence was found of significant dipolar interaction effects on the peak position of the imaginary part of the ac-susceptibility and on the relaxation time due to the common easy axis and the low-dimensionality of the assemblies even for low concentration (less than 10%). With increasing the strength of the dipolar interactions, the peak of the out-of-phase component shifts towards higher or lower temperatures depending on whether the magnetic moments are oriented in the plane assembly or perpendicular to it. A peak shift towards higher (lower) temperatures is clearly linked to an increase (decrease) of the relaxation time. The relaxation time in the presence of dipolar interactions still follows an Arrhenius law with an effective energy barrier which is either larger or smaller than the anisotropy energy barrier. It is also shown that random positions slightly strengthen the influence of dipolar interactions