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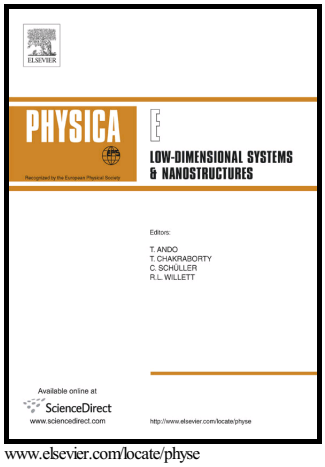

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PII: S1386-9477(17)30668-9
DOI: http://dx.doi.org/10.1016/j.physe.2017.08.003
Reference: PHYSE12883

To appear in: *Physica E: Low-dimensional Systems and Nanostructures*

Received date: 8 May 2017
Revised date: 18 July 2017
Accepted date: 4 August 2017

Cite this article as: T. Kaneyoshi, Effects of random fields in an antiferromagnetic Ising bilayer film, *Physica E: Low-dimensional Systems and Nanostructures,* http://dx.doi.org/10.1016/j.physe.2017.08.003

Effects of random fields in an antiferromagnetic Ising bilayer film

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Abstract

The magnetic properties (phase diagrams and magnetizations) of an antiferromagnetic Ising bilayer film with random fields are investigated by the use of the effective field theory with correlations. It is examined how an uncompensated magnetization can be realized in the system, due to the effects of random fields in the two layers. They show the tricritical, compensation point and reentrant phenomena, depending on these parameters.

Keywords

Phase diagrams, Magnetizations Tricritical behavior, Compensation point, ,Reentrant phenomena, Ising bilayer film

1. Introduction

In recent years, a noticeable interest has been directed to the investigations of various nanoscaled magnetic systems, experimentally and theoretically. They are ideal for the studies of finite-size effects (or surface effects), since most of constituent atoms in them are existed at the surface (or surfaces). Because of the finite-size effects, the associated magnetic properties are modified remarkably from the corresponding bulk ones. In these nanoscaled systems, ferromagnetic ultra-thin films are one of ideal models for clarifying the finite-size effects and a lot of experimental and theoretical works have been done, such as the thickness dependences of transition temperature (or T_C). Furthermore, the experimental observation for clarifying the finite-size