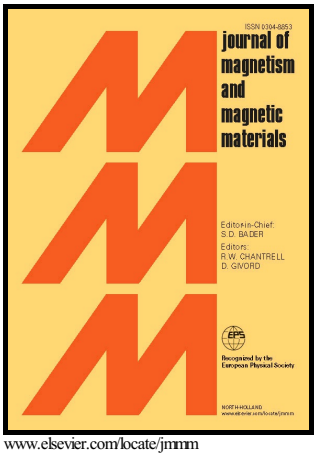
Magnetic studies of spin wave excitations in Fe/Mn multilayers

H. Salhi, R. Moubah, A. El Bahoui, H. Lassri



www.elsevier.com/locate/jmmm

PII: S0304-8853(16)30810-1
DOI: http://dx.doi.org/10.1016/j.jmmm.2016.12.068
Reference: MAGMA62276

To appear in: *Journal of Magnetism and Magnetic Materials*

Received date: 24 May 2016
Revised date: 14 November 2016
Accepted date: 17 December 2016

Cite this article as: H. Salhi, R. Moubah, A. El Bahoui and H. Lassri, Magneti studies of spin wave excitations in Fe/Mn multilayers, *Journal of Magnetism an Magnetic Materials,* http://dx.doi.org/10.1016/j.jmmm.2016.12.068

Magnetic studies of spin wave excitations in Fe/Mn multilayers

H. Salhi[a,b], R. Moubah[a], A. El Bahoui[a], H. Lassri[a]

[a]*LPMMAT, Faculté des Sciences Ain Chock, Université Hassan II de Casablanca, B.P. 5366 Mâarif, Casablanca, Morocco*

[b]*LMPG, Ecole supérieure de technologie, Université Hassan de Casablanca, Casablanca, Morocco.*

Abstract

The structural and magnetic properties of Fe/Mn multilayers grown by thermal evaporation technique were investigated by transmission electron microscopy, vibrating sample magnetometer and spin wave theory. Transmission electron microscopy shows that the Fe and Mn layers are continuous with a significant interfacial roughness. The magnetic properties of Fe/Mn multilayers were studied for various Fe thicknesses *(t_{Fe})*. The change of magnetization as a function of temperature is well depicted by a $T^{3/2}$ law. The Fe spin-wave constant was extracted and found to be larger than that reported for bulk Fe, which we attribute to the fluctuation of magnetic moments at the interface, due to the interfacial roughness. The experimental M (T) data were satisfactory fitted for multilayers with different Fe thicknesses; and several exchange interactions were extracted.

Keywords: Fe/Mn multilayer; Magnetization; Spin wave excitations; Exchange interactions

1. Introduction

Investigation of magnetic multilayers is a subject of importance on both the fundamental and technological levels. These heterostructures are widely used in many potential applications such as read heads, or magnetic memory-storage cells [1,2,3]. At the same time, the mechanisms implicated in their interlayer exchange coupling are not trivial [4] and several models based on total energy calculations, Ruderman-Kittel-Kasuya-Yosida (RKKY) or Green function method have been developed to study their properties [5,6].The properties of these heterostructures are greatly affected by their microstructure [7,8,9]. In order to exploit