

Parameter-free determination of the exchange constant in thin films using magnonic patterning

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APPLIED PHYSICS LETTERS

Volumen: 108

Número: 10

Número de artículo: 102402

DOI: 10.1063/1.4943228

Fecha de publicación: MAR 7 2016

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Resumen

An all-electrical method is presented to determine the exchange constant of magnetic thin films using ferromagnetic resonance. For films of 20 nm thickness and below, the determination of the exchange constant A , a fundamental magnetic quantity, is anything but straightforward. Among others, the most common methods are based on the characterization of perpendicular standing spin-waves. These approaches are however challenging, due to (i) very high energies and (ii) rather small intensities in this thickness regime. In the presented approach, surface patterning is applied to a permalloy (Ni80Fe20) film and a Co2Fe0.4Mn0.6Si Heusler compound. Acting as a magnonic crystal, such structures enable the coupling of backward volume spin-waves to the uniform mode. Subsequent ferromagnetic resonance measurements give access to the spin-wave spectra free of unquantifiable parameters and, thus, to the exchange constant A with high accuracy. (C) 2016 AIP Publishing LLC.

Palabras clave

KeyWords Plus: SPIN-TRANSFER TORQUE; FERROMAGNETIC-RESONANCE; PERMALLOY

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Dirección para petición de copias: Langer, M (autor para petición de copias)



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Financiación

Entidad financiadora	Número de concesión
Nanofabrication Facilities Rossendorf at IBC	
DFG	LE2443/5-1

[Ver texto de financiación](#)

Editorial

AMER INST PHYSICS, 1305 WALT WHITMAN RD, STE 300, MELVILLE, NY 11747-4501 USA

Categorías / Clasificación

Áreas de investigación: Physics

Categorías de Web of Science: Physics, Applied

Información del documento

Tipo de documento: Article

Idioma: English

Número de acceso: WOS:000372973600023

ISSN: 0003-6951

eISSN: 1077-3118

Información de la revista

- Impact Factor: [Journal Citation Reports®](#)

Otra información

Número IDS: DH7KV

Referencias citadas en la Colección principal de Web of Science: **31**

Veces citado en la Colección principal de Web of Science: **0**