

537.6, 537.623, 537.624, 538.955

Влияние немагнитного слоя на однонаправленную анизотропию в трехслойной системе Fe/Cu/CoO

Петр Д. Ким*

Геннадий С. Патрин

Дмитрий А. Марущенко

Игорь А. Турпанов

Институт физики им. Л.В. Киренского,
Сибирское отделение РАН,
Академгородок 50/38, Красноярск, 660036,
Россия

Людмила А. Ли

Институт фундаментальной подготовки,
Сибирский федеральный университет,
Свободный 79, Красноярск, 660041,
Россия

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Данная работа посвящена изучению зависимости обменного смещения от толщины промежуточного слоя меди и температуры в поликристаллических трехслойных пленках ферромагнетик/немагнитный металл/антиферромагнетик (Fe/Cu/CoO). Выявлен осциллирующий характер величины обменного смещения в зависимости от толщины медной прослойки. Осцилляция наиболее четко проявляется в определенном диапазоне температур. Впервые нами обнаружена осцилляция обменного смещения с ростом температуры, данные осцилляции происходят со сменой знака поля обменного взаимодействия.

Ключевые слова: тонкие пленки, обменное взаимодействие, однонаправленная анизотропия.

[1]. ()

50

[2].

()

(),

[3]

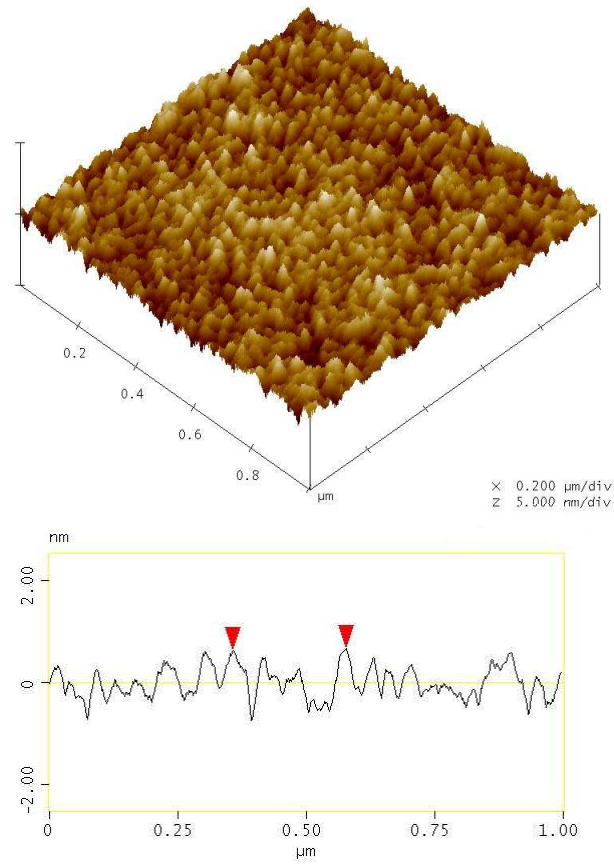
" [4].

(),

(/)_n

*kim@iph.krasn.ru

[5-7].	-	-	-	()-	-
[8, 9].	(- - - ()-	-	-	-	-
[10, 11].	-	-	-	-	-
				[5].	-
				-	-
				-	[3],
	~1	[12]. ~11	[13] (- Cu)	-	-
				-	-
				-	-
	(), Co/Au/CoO	-	-
[14].	[15]	Cu	Fe/Cu/CoO,	-	-
				-	-
			FeMn, ~18-20 NiFe/Cu/IrMn	[16].	Cu,
					-
			~8		-
			[17].		-
				[3, 18].	-
			Fe/Cu/CoO.		-
Fe/Cu/CoO					-
	9 mTorr.	CoO	5		-
	Cu,	CoO,	0,25 4 . 10	Fe	-
	Cu.		()	-
			0,2-0,3	. 1	-
	3d ()				-
					-
	(~300 K, 2,5		(=293)	Fe,	-



. 1.

Fe/Cu/CoO, -

77 .

(H)

(80). . 2

Fe (100 Å)/Cu

(2,5 Å)/CoO (50 Å)

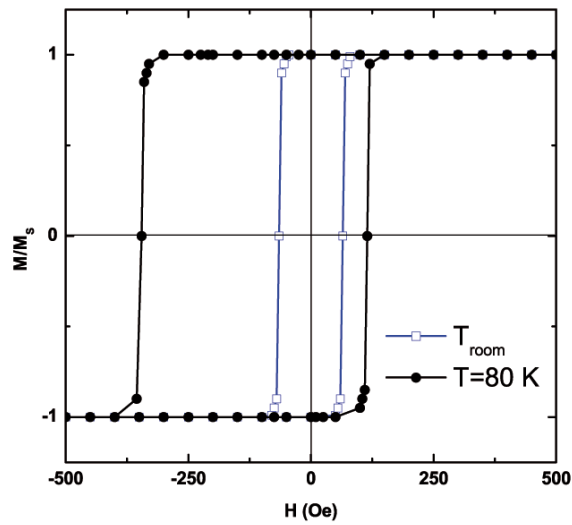
2,5 .

. 3 a

180 ,

(. 3 b, c, d, e).

[19, 20].



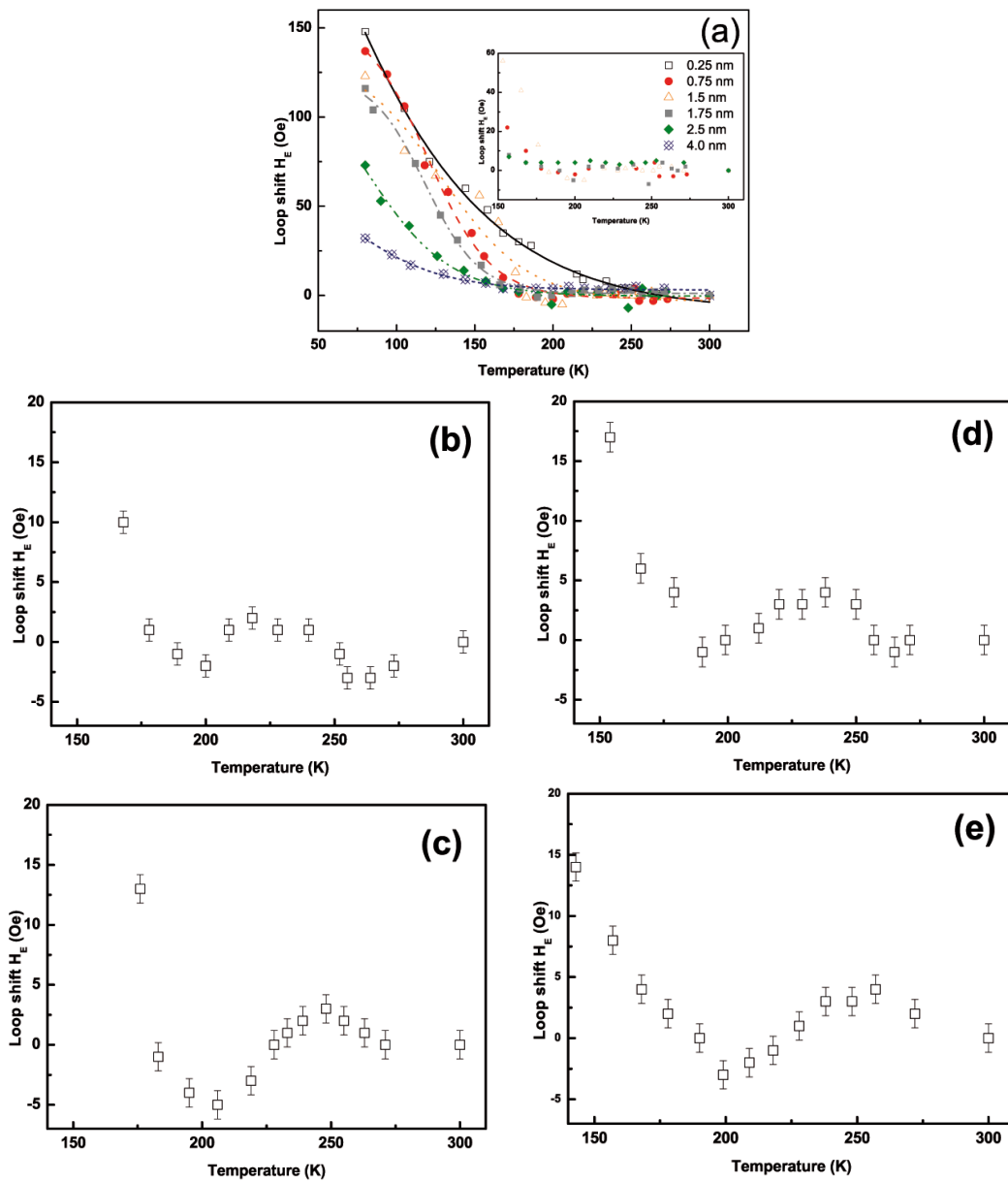
2. Fe /Cu (*t*_{Cu})/CoO 0,25 80 K
2,5

[21].
4
Fe (100 Å)/Cu (*t*)/CoO (50 Å) 80 40 Å.

120 K, [22, 23]. 120 175 10 Å
Co/Cu/Co, Fe/Cu/Fe [24, 25] c
Co/Cu [26].
M/ / M- M/ / -

$$E = J_{INT}(T, t)S_F S_{AF,i} + J_{AF}(T)S_{AF,i}S_{AF}, \quad (1)$$

S_F - , $S_{AF,i}$ - , S_{AF} -
 J_{INT} - , J_{AF} -
 $J_{INT}(T, t)$ - , $J_{AF}(T)$ -
 $t = 0$, $J_{INT}(T, 0)$ - $J_{F/AF}(T)$ (- - -),
 J_{INT} -



3.

Fe/Cu (t_{Cu})/CoO.

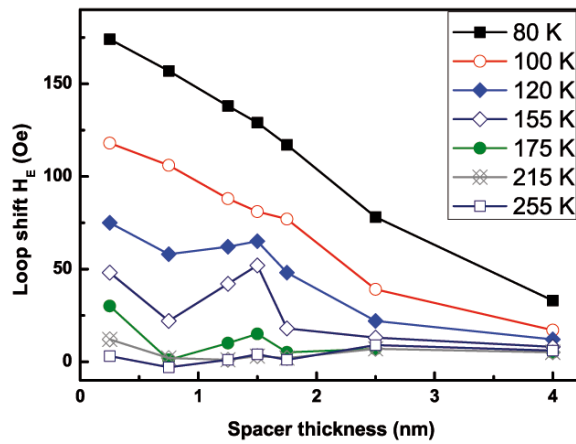
0.75 (b), 1.5 (c), 1.75 (d) 2.5 (e)

J_{dip}

J_{dip}

($J_{РККИ}$) [27–30].

$J_{РККИ}$



4.

Fe/Cu (t_{Cu})/Co

$T < T_C$ [29],

$T \ln T$ [32].

[33].

, $J_{РККИ}$

$J_{РККИ}$,

, $J_{РККИ}$

J_{dip} J_{AF} $J_{РККИ}$
 T_N , $J_{РККИ}$

J_{dip} J_{AF}

, H_E

$J_{РККИ}$ J_{dip} ,

$J_{РККИ}$ J_{AF} ,
 H_E .

Fe/Cu/CoO.

Fe/Cu/CoO

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The Influence of Nonmagnetic Layer on Unidirectional Anisotropy in Trilayer System Fe/Cu/CoO

Petr D. Kim
Gennady S. Patrin
Dmitry A. Maruschenko
Igor A. Turpanov
Ludmila A. Li

This paper considers the dependence exchange bias on the thickness of the intermediate layer of copper and temperature in polycrystalline thin films ferromagnet / nonmagnetic metal / antiferromagnet (Fe/Cu/CoO). We have revealed oscillatory of exchange bias value in depending on the thickness of the copper layer. The oscillation of the most clearly manifested in a certain range of temperatures. For the first time by us detected the oscillation of the exchange bias with increasing temperature, these oscillations occur with a change of sign of the field exchange interaction.

Keywords: thin films, exchange interaction, unidirectional anisotropy.