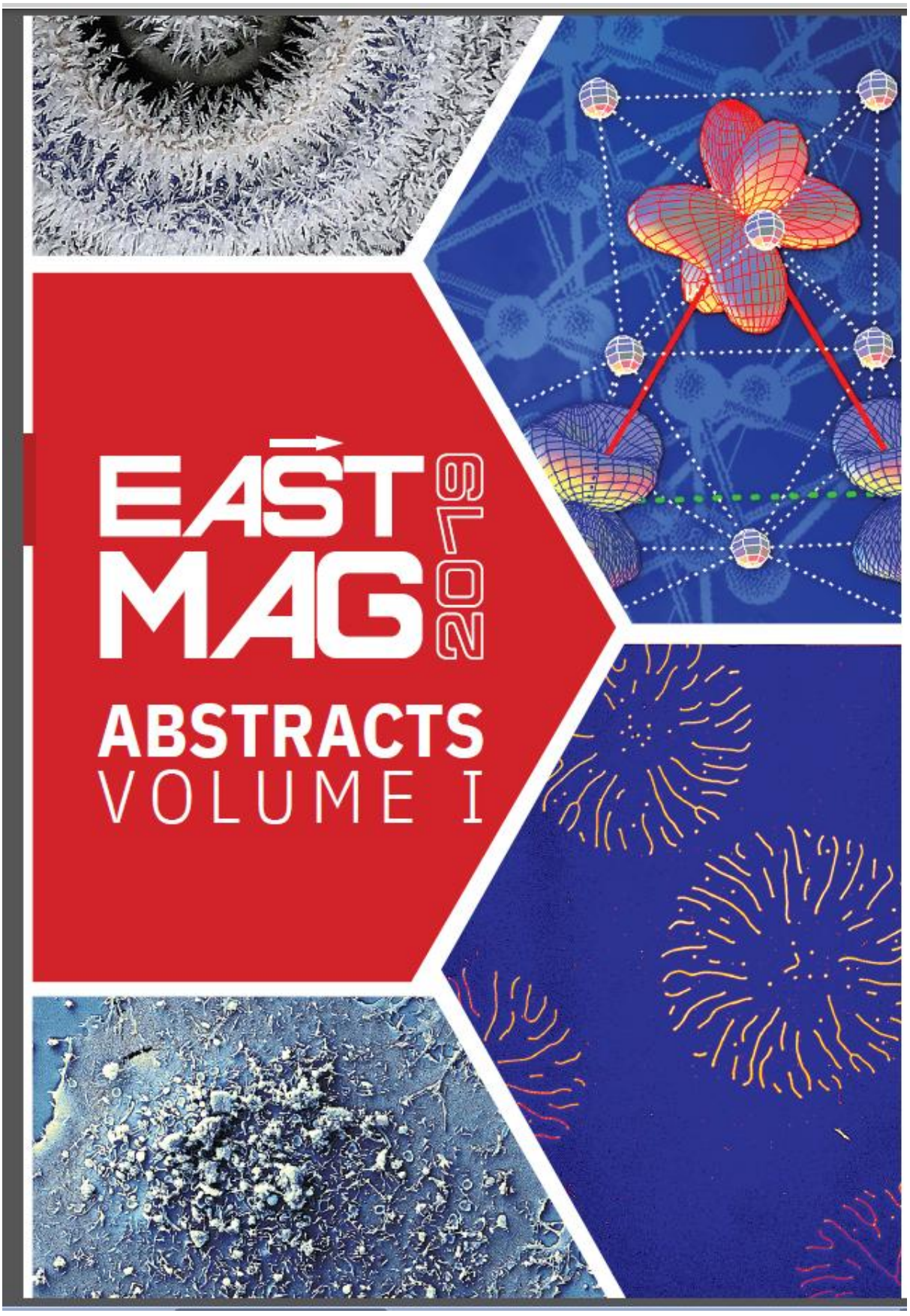

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ABSTRACTS
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BOOK OF ABSTRACTS. VOLUME I

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C.P30

THE INFLUENCE OF THE SEMICONDUCTOR LAYER ON THE MAGNETIC PROPERTIES IN A THREE-LAYER STRUCTURE CoNi/Si/FeNi

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To present day the problem of forming of magnetic state in multilayer system ferromagnetic metal/semiconductor is remaining undecided totally. In the case of conjugated magnetically soft and magnetically hard ferromagnetic layers, a new state similar to the magnetic spring can occur. Then, the magnetization process involves certain stages and the hysteresis loop has a specific [1]

Previously, a three-layer structure CoNi/Si/FeNi, was obtained. They found the effect of positive exchange bias. The interlayer interaction of ferromagnets depends on the thickness of the semiconductor layer [2]. The study was continued to determine the effect of the semiconductor layer on the effect of positive exchange bias and the determination of the partial contributions from the hard magnetic and. soft magnetic layers.

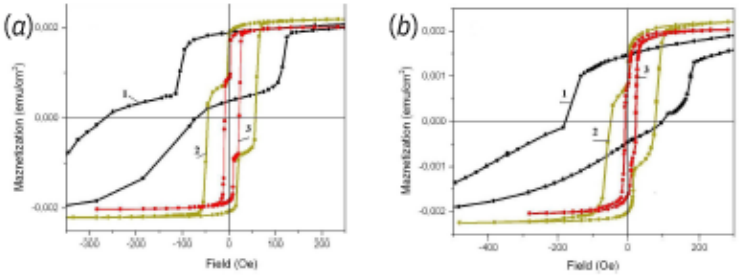

Figure 1. Magnetization loops for CoNi/Si/FeNi films. (*a*) and (*b*): $t_{Si} = 2$; 7 nm. 1, 2, 3: $T = 5$, 100, 300 K

The method was a deposition onto a glass substrate by ion-plasma sputtering at a base pressure of $\sim 10^{-8}$ Torr. The thickness of magnetic hard layer (CoNi) was $t_h = 25$ nm and magnetic soft layer (FeNi) was $t_s = 25$ nm. The thickness of intermediate nonmagnetic semiconducting layer (Si) was variable and it was changed in range $t_{Si} = 3 - 8$ nm. Layer thickness was controlled by X-ray spectroscopy with a measurement accuracy of ± 0.5 nm. The magnetic properties were investigated on an MPMS-XL magnetic property measurement. Electron microscopy cross-section study was carried out on a JEM-2100 transmission electron microscope and one indicates existence of sharp boundary between silicon and both magnetic layers. The displacement of the hysteresis loop in a negative direction was found when the thickness of the silicon layer is less than 2 nm., and the temperature is less than 100 K. And the displacement of the hysteresis loop in a positive direction when the thickness of the silicon layer is more than 2 nm. and higher temperatures (Fig. 1). Here, the interlayer exchange interaction through the silicon layer plays an important role. Both magnetizations of ferromagnetics are functions of an external magnetic field. This behavior suggests that the interlayer interaction is alternating in character. Where it is negative, there is a positive bias in the magnetization loop.

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