MAGNETIC MATERIALS. NEW TECHNOLOGIES

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VARGA RASTISLAV

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Тезисы докладов
VII Байкальской Международной конференции

Пос. Листвянка, Иркутская область,
Российская Федерация
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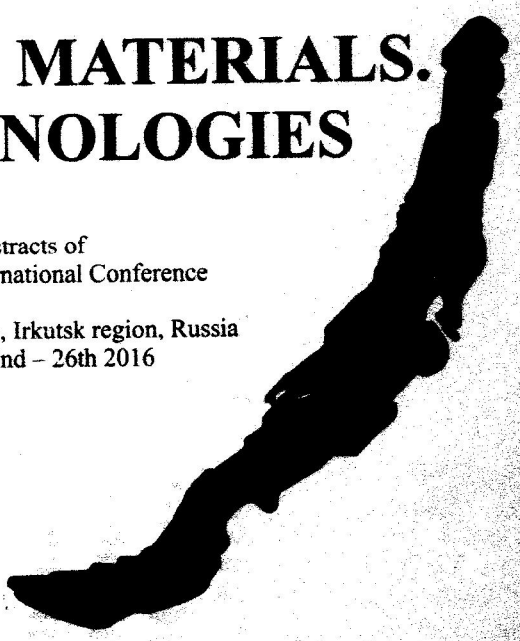

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Министерство образования и науки Российской Федерации
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TECHNICAL AND BIOMEDICAL APPLICATIONS OF GLASS-COATED MICROWIRES

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Amorphous glass-coated microwires are composite materials that consists of metallic nucleus (diameter of ~0.1-50 μm) that is covered by glass-coating (thickness ~2-20μm) that are produced by drawing and quenching of molten master alloy. As a result of production process, it is a magnetoelastic anisotropy that determines their magnetic properties. Having positive magnetostriction, the amorphous glass-coating microwires are characterized by magnetic bistability (magnetization has only two values +Ms or -Ms). The switching between the two values of magnetization appears at the so-called switching field by the single Barkhausen jump.

The switching field is sensitive to various external parameters (magnetic field, temperature, mechanical stress, etc [1]), which gives us possibility to employ the microwires in construction of microsensors. Their dimensions allows their application inside various composite materials [2]. Glass-coating increases their resistance again chemically aggressive environment [3] as well as provide their biocompatibility [4].

In the given contribution, the various examples of possible applications of bistable microwires will be present. The possibility of health and stress monitoring of various composite materials, applications of microwires in medicine as well as different sensors utilization of microwires in construction and magnetometry will be shown.

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References.

[1] R. Varga, „Magnetization processes in glass-coated microwires with positive magnetostriction", Acta Physica Slovaca V. 65, P.411-518 (2012).

[2] D. Praslička, J. Blažek, M. Šmelko, J. Hudák, A. Čverha, I. Mikita, R. Varga, A. Zhukov, "Possibilities of Measuring Stress and Health Monitoring in Materials Using Contact-less Sensor Based on Magnetic Microwires" IEEE Trans Magn. V.49, P.128 (2013).

[3] J. Olivera, M. González, J. Vicente Fuente, R. Varga, A. Zhukov and J. J. Anaya „An Embedded Stress Sensor for Concrete SHM Based on Amorphous Ferromagnetic Microwires", Sensors V.14, P.19963-19978 (2014).

[4] R. Hudak, R. Varga, J. Hudak, D. Praslicka, I. Polacek, P. Klein, R. El Kammouni, and M. Vazquez, „Influence of Fixation on Magnetic Properties of Glass-Coated Magnetic Microwires for Biomedical Applications", IEEE Trans. Magn. V.51, P.5200104, (2015).