



Progress in development of magnetically soft amorphous microwires for microsensor applications

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Abstract

Recent advances in technology involving magnetic materials require development of novel advanced magnetic materials with improved magnetic and magneto-transport properties. Additionally the tendency on miniaturization of the modern magnetic sensors and devices stimulates development of such magnetic materials with reduced dimensionality. Therefore magnetic materials with outstanding magnetic characteristics and reduced dimensionality recently gained much attention. Among these magnetic materials a family of thin wire with reduced geometrical dimensions (of order of 1-30 μm in diameter) gained importance within last few years (Kraus *et al.*, 1976; Zhukov *et al.*, 2004; Chiriac and Ovari, 1997; Zhukov *et al.*, 2008). These thin wires combine excellent soft magnetic properties (with coercivities till 4 A/m) with attractive magneto-transport properties (Giant Magneto-impedance effect, GMI, Giant Magneto-resistance effect, GMR) and unusual re-magnetization process in positive magnetostriction compositions exhibiting quite fast domain wall propagation (Kraus *et al.*, 1976; Zhukov *et al.*, 2004; Chiriac and Ovari, 1997; Zhukov *et al.*, 2008; Varga *et al.*, 2007).

In this paper we'll overview magnetic and magneto-transport properties of these microwires.

Key words: *Development of novel advanced magnetic materials, Improved magnetic and magneto-transport properties, Thin wire with reduced geometrical dimension, Fast domain wall propagation*

1. Effect of composition properties relevant for applications

In fact studies of magnetic amorphous glass coated microwires started even in 70-th (Kraus *et al.*, 1976), but recently these glass-coated ferromagnetic wires have been

re-discovered mainly due to a number of unusual magnetic properties and their potential applications (Zhukov *et al.*, 2004; Chiriac and Ovari, 1997; Zhukov *et al.*, 2008; Varga *et al.*, 2007).

Magnetic properties and overall shape of hysteresis loops of amorphous microwires depends on composition of the metallic nucleus as well as on composition and