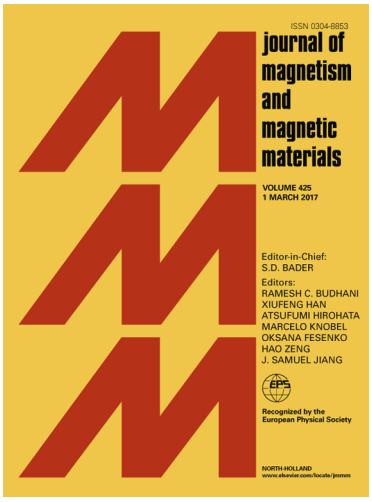

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Magnetocaloric Effect in Cold Rolled Foils of $Gd_{100-x}In_x$ (x = 0, 1, 3)

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Abstract. In this work we report on direct measurements of magnetocaloric effect in plastically deformed Gd-In solid solutions in the shape of foils with concentration of indium up to 3 at.%. When compared to the reference polycrystalline bulk samples, magnetocaloric effect in the cold-rolled foils of $Gd_{100-x}In_x$ (x = 0, 1, 3) turned out to be systematically smaller. This was suggested to be due to a cold rolling-induced local magnetic anisotropy which can be diminished by an appropriate thermal treatment of the cold-rolled samples. A linear dependence of Curie temperature on the In concentration makes the $Gd_{100-x}In_x$ foils suitable for applications in active magnetic regenerative refrigerators with a rapid heat exchange.

PAC's: 75.30.Sg , 75.50.Gg, 65.40.gd.

Introduction

Since the active start of designing magnetic refrigeration devices, many promising models have appeared in different laboratories all over the world [1]. After a recent release of the first commercial magnetic refrigerator made by Cooltech [2], the magnetic refrigeration has become *de facto* alternative to the vapor-compression based technology. This achievement faces new challenges for materials scientists and engineers to improve technical characteristics of the developed magnetic refrigerators. For optimal and effective cycle of active magnetic regenerative (AMR) refrigerators one should solve at least two following tasks:

- to synthesize a set of magnetocaloric materials with different Curie temperature within the desired operation temperature range;
- to make these materials in quasi 2D- or 1D-like form (ribbons, flakes, microwires, etc.) for rapid heat exchange.

On this way the bottleneck is the magnetocaloric materials with both Curie temperature tunable in a wide temperature interval and a large magnetocaloric effect (MCE). Despite