

## Unforeseen properties of MnAs epilayers grown on GaAs semiconductor

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MnAs epilayers grown on GaAs substrates offer spin-polarized source for spin injection in GaAs-based spintronics devices [1]. Moreover MnAs films grown on GaAs(001) display, at room temperature, a self-organized pattern of submicron-wide stripes, alternating the ferromagnetic hexagonal  $\alpha$ -MnAs phase with the paramagnetic orthorhombic  $\beta$ -MnAs phase [2]. The stripes are aligned parallel to the  $c$  axis of the  $\alpha$ -MnAs phase, whose easy magnetization direction is perpendicular to the stripes. The film thickness controls both the period and the height of the stripes. For a given thickness, i.e., for a given period, the sample temperature  $T$  determines the relative width of  $\alpha$  and  $\beta$  stripes. With its regular pattern of submicron wide stripes with a nanometric corrugation, MnAs/GaAs(001) can be considered also as a self-organized template for the growth of nanometer-thick magnetic layers, whose magnetic properties can be controlled by changing the temperature.

In this talk, I will introduce the intriguing use of this template to modify the magnetic behaviour of iron epilayers deposited on it [3-5].

I will also present our findings on giant magnetocaloric effect (MCE) displayed by MnAs epilayers. This effect is also associated with the magneto-structural  $\alpha$ -MnAs /  $\beta$ -MnAs first-order phase transition. We have successfully demonstrated the possibility to control the MCE behaviour by selecting the epitaxial relation between MnAs and GaAs substrate [6].

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