

Overview of growth and magnetic properties of GeMn epilayers: from thin films to quantum dots

V. Le Thanh,
Aix-Marseille University, Marseille - France
lethanh@cinam.univ-mrs.fr

The development of spintronics devices that utilize both the spin and charge of electrons calls for new classes of materials that are able to efficiently inject spin-polarized currents into conventional semiconductors. Those materials should have not only a high Curie temperature (T_C) and a high spin polarization but also are compatible with the existing Si complementary metal-oxide semiconductor (CMOS) technology. To make advances in applications, an alternative approach has been recently developed in which high- T_C ferromagnetic compounds, such as Mn_5Ge_3 , can be used as spin injectors. In this presentation, we shall provide an overview and perspectives of research carried out in the MnGe/Ge system [1-5]. Results on epitaxial growth of Mn_5Ge_3 on Ge and the magnetic anisotropy of Mn_5Ge_3 films will be presented. We shall show how to control and modify the magnetic properties of Mn_5Ge_3 films upon carbon doping. Finally, we shall present a typical example in which under proper epitaxial growth conditions, the process of self-assembly in GeMn films and quantum dots can result in the formation of the highest Curie temperature in all DMS systems investigated up to now

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