

Enhancing some characteristic properties of magnetic micro-/nano- materials

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Metal-oxide materials are of particular interest as exhibiting a wide variety of physical properties, such as conducting/non-conducting behaviours at different ranges of frequency, tunnelling of the magnetization at nano-scaled structures, enhanced photoluminescence in semiconductor quantum wells, as well as their numerous commercial applications in microelectronics, data storage, optoelectronics, etc.

Firstly, in this presentation, some micro-/nano-structure based magnetic and non-magnetic oxides have been prepared by different chemical and physical techniques. By changing processing parameters, for example annealing/substrate temperature, ambient pressure, starting composition and by doping metallic elements, one can be able to modify crystallographic- and micro- structure and magnetic properties of the materials. Grain size, exchange of ion valences and their crystallographic sites, stress-induced effect on the change in magnetic properties will be discussed.

Secondly, multilayer structured composites of ferro-electrics and -magnetics having a significant relative change in magnetization have been investigated. A theory based on strain-mediated magnetic-electric coupling will be reported to understand the properties enhancement. This could be useful for practical applications in new types of multi-functional devices.