# Magnetic Interactions of Metal Deposits within Nanostructured Silicon Investigated by FORC Measurements

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In the frame of this work magnetic interactions between metal deposits within nanostructured silicon are investigated. Various composite systems consisting of porous silicon (PSi) and silicon nanotubes (SiNTs) with embedded Ni, Co, NiCo and $Fe_3O_4$ structures are discussed. Magnetic cross-talk between metal deposits can be controlled by the morphology of the PSi (distance between the pores) or SiNTs (wall thickness) and also by the distribution and size of the deposits within the pores. To get a clear knowledge about the magnetic interactions single hysteresis curves are not sufficient and thus first order reversal curves (FORC) are performed at various temperatures. The employed PSi structures offer an average pore-diameter of 50 nm and a mean distance between the pores of 50 nm which ensures a clear separation of the pores, a crucial point to achieve the appropriate magnetic properties. SiNTs with similar dimensions are used. The magnetic materials are deposited electrochemically or grown electroless within the pores/tubes. The temperature-dependency of the magnetization of the nanocomposite systems is a further realm of this work. The temperature is varied between 80 and 1273 K which allows to determine the Curie Temperature of the composites and to compare with the one of the corresponding bulk materials.