# MAGNETIC NANOBEADS USED FOR DEVELOPMENT OF STRUCTURED BIOCOMPATIBLE SURFACES TO INDUCE CELL DIFFERENTIATION

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The general intention of this work is to produce functionalized surfaces by using magnetic beads on a biocompatible carrier substrate to induce cell differentiation.Thin films of PtFe or CoCr are deposited to the substrate by sputtering. Subsequently they can be structured by optical, e-beam or contact lithography. Substrates with particular domain structures are applied as well. In a further step magnetic beads are deposited onto the magnetically structured substrate. These beads are composed of maghemite/magnetite ($Fe_2O_3/Fe_3O_4$) embedded in a biocompatible dextran matrix with $NH_2$ reactive groups. They have a diameter of 20nm - 1µm. The $NH_2$ groups provide a basis for the covalent functionalization by growth or differentiation factors.

The set up allows the investigation of the influence of substrate roughness, structural geometry, and immobilized growth factors on living cells. The mayor advantage consists in the possibility to obtain biologically functional surfaces without complex chemical approaches.

By using scanning probe and electron microscopy, the interactions between living cells and the above mentioned surfaces can be characterized. Additionally the cells´ morphology and topography are investigated by atomic force microscopy in the tapping mode (force-distance curves). Magnetic force microscopy allows the examination of the magnetic structures and bead properties.