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Spatially and temporally varying magnetic, biocompatible substrates for induction of cell differentiation — •Juliane Issle, Martin Loichen, and Uwe Hartmann — Institute of Experimental Physics, University of Saarland, 66123 Saarbruecken, Germany

The main goal of the here presented work is to develop a method to induce (stem-) cell differentiation by means of surface-cell interaction. The setup consists of three parts: the biomolecules, magnetic beads as carriers for the biomolecules and a magnetic carrier substrate.

Magnetic nanobeads of an average diameter of 250 nm are commercially available with different surface groups, like carboxylic or amino groups. The magnetic core consists of 20 nm magnetite crystals kept together by means of a dextran matrix. Magnetization curves show that they are superparamagnetic. Cell type specific biomolecules can be covalently bound to the reactive surface groups of the nanobeads. As magnetic carrier substrates out-of-plane magnetized garnet films with particular domain structure are used as they appeared to be biocompatible. The domain structure can be changed using perpendicular or parallel external magnetic fields. As long as the set up is kept in liquid environment (cell culture medium) the nanobeads can follow the domain changes, once they are deposited onto the domain walls.

This opens the opportunity to change the structure of the substrate in vitro and to investigate the influence of topographical as well as chemical substrate changes on cell growth and differentiation. The physical properties of the described setup are analyzed mainly by AFM and MFM, fluorescence microscopy, magnetometry and SEM.

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