

Contribution submission to the conference Berlin 2008

Addressing cells via immobilized magnetite particles on magnetically variable substrates — ●JULIANE ISSLE and UWE HARTMANN — Universität des Saarlandes, Institut für Experimentalphysik, Campus C6 3, D-66123 Saarbrücken

It is well known that magnetite nanoparticles in the range of 200 nm are biocompatible and they are used in drug delivery, hyperthermia etc. A new approach of immobilizing these beads by means of magnetic interaction on certain substrates gives rise to the opportunity to address cells via transmembrane pathways without particle internalization. Magnetometry and Magnetic Force Microscopy deliver insight to the structural and magnetic properties of the nanoparticles. Magnetic garnet layers with perpendicular anisotropy, which enables magnetic bead deposition, have been used. They turned out to be biocompatible and furthermore the domain structure can be varied by application of external magnetic fields. The calculation of the interaction between particles and surface stray field shows that the forces are in the 100 pN range, so that cells can not take up the beads once they are immobilized. A climate chamber and coils to produce magnetic fields were integrated into an inverted microscope. This allows the investigation of cell behavior over days with respect to structural substrate changes in the range of some seconds to several days.

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