Student Projects

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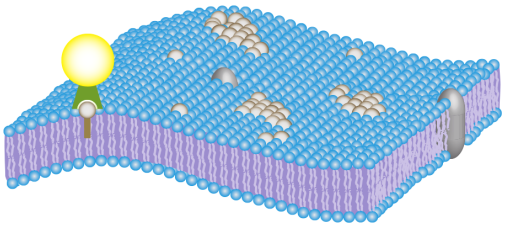
Project 1

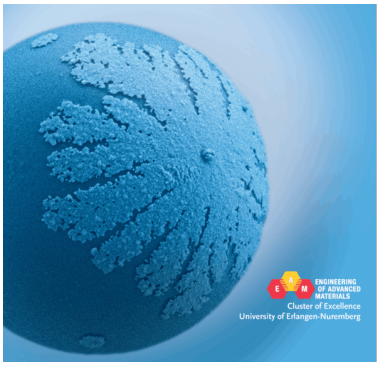
Monte-Carlo simulations of diffusion through the dynamic scaffold in a membrane



Even though a number of measurements of the transport in biological membranes suggest anomalous diffusion, no microscopic model has emerged that explains the origin of such behaviour. The aim of this work is to simulate the diffusion in a membrane as a Monte-Carlo random walk on a two–dimensional lattice with scaffolds which can catch the diffusing particles. This binding dynamically changes the scaffold shape and obstructs the diffusion of a particle that has been bound. The results of these simulations are expected to provide the basis for a model that should explain the lateral diffusion in a membrane.

Project 2

Modelling the growth of gold on silica beads



(source: http://onlinelibrary.wiley.com/doi/10.1002/adma.201190079/abstract)

When we put silica beads with a seed in a saturated solution of golden ions, a fractal-like growth of the golden area is observed in experiments (see figure on the left). This process is defined by a diffusion on the bead spherical surface and a binding reaction on the edge of the growing golden area. In this work we aim to improve the existing Monte-Carlo code for this specific problem and to develop a model for this kind of growth based on the simulation results.