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Simulation of cellular shapes on micro-patterned substrate using the Cellular Potts Model BENOIT VIANAY, HERVE GUILLOU, Institut Neel - CNRS Grenoble - FRANCE, THERMODYNAMIC OF SMALL SYSTEMS TEAM — Cell adhesion and motility are processes involved in fundamental biological phenomena using biological structures as anchorage points and cytoskeleton filaments which are very dynamical and at non-equilibrium. We study cell adhesion on micro-patterned substrate where an introduction of a finite distance between anchorage points of the cell modifies drastically the organization of the cytoskeleton and the anchorage point's distribution. Some of statistically most used shapes represent stationary states of the system which should minimize the energy dissipation. We verified this hypothesis reproducing morphologies by simulation of Monte Carlo using the Cellular Potts Model (Graner and Glazier, PRL69 p2013 (1992)). Shapes obtained by simulation depend of four phenomenological parameters as interaction between cell and ECM and are in excellent qualitative agreement with experimental shapes. The aim of this presented work is to link model parameters to physico-chemical properties of cells and to establish phenomenological relations between interesting parameters controlling the cytoskeleton organization. Collaborations : J. Kafer & F. Graner : Laboratoire de spectrometrie Physique – Grenoble; E. Plannus & M. Block : Institut Albert Bonniot – Grenoble.

Benoit Vianay
Institut Neel - CNRS Grenoble - FRANCE

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