Fritz-Haber-Institut der Max-Planck-Gesellschaft, Humboldt-Universität zu Berlin, Max-Delbrück-Centrum für Molekulare Medizin, Otto-von-Guericke-Universität Magdeburg, Physikalisch-Technische Bundesanstalt, Technische Universität Berlin, Universität Potsdam

Berlin Center for Studies of Complex Chemical Systems

Seminar

Complex Nonlinear Processes in Chemistry and Biology

Honorary Chairman: G. Ertl
Organizers: M. Bär, C. Beta, H. Engel, M. Falcke, M. J. B. Hauser, J. Kurths, A. S. Mikhailov, P. Plath, L. Schimansky-Geier, and H. Stark

Friday, December 18, 2015, at 16:00
Attention! Change of address: Technische Universität Berlin, Hardenbergstraße 36, 10623 Berlin, Eugene-Paul-Wigner-Gebäude EW 733

Dr. Svetlana Gurevich

Westfälische Wilhelms-Universität Münster

Control and selection of spatio-temporal patterns in dynamic self-assembly systems

Self-organization or dynamic self-assembly is a mechanism responsible for the formation of complex structures through multiple interactions among the microscopic components of the system. In the first part of the talk the formation of regular stripe patterns during the transfer of surfactant monolayers from water surfaces onto moving solid substrates is discussed by means of a generalized Cahn-Hilliard equation. A combination of numerical simulations and continuation methods is employed to investigate stationary and time-periodic solutions of the model. The second part of the talk deals with the influence of prestructured substrates on the patterning process. We show that the occurring locking effects enable a control mechanism via properties of the prestructure and facilitate the production of patterns with a broader range of features. In two dimensions, the production of a variety of complex patterns can be achieved through the competition of intrinsic properties of the pattern forming system and the external forcing introduced by a prestructure. Finally, a different control mechanism by means of a modulated transfer velocity is discussed. Our results predict that this method can also be used as an effective tool to control the pattern formation process.