



NCCR MARVEL Distinguished Lecture

On the Mesoscale Science Frontier in Materials Theory and Simulation

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Abstract: A frontier in theory, modeling and simulation of materials exists at the mesoscale. The challenge is to predict and explain properties and behavior at the macroscale (usually from experiments) using model and simulation at the nano-level. At stake is the determination of the controlling mechanisms and the ability to manipulate the functionality of specific materials. Conceptually it is also the key to expand on the notion of self-organized criticality. We consider examples of materials aging phenomena where the challenge lies in dealing with the slow dynamics involved and bridging time scales in multiscale and multiphysics simulations. These examples include glass viscosity, creep in crystalline and amorphous solids, and cement setting and durability.