

## 第 101 回化学コロキウム

日時：平成19年7月30日(月) 13:00~15:00

場所：国際交流会館 中会議室

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演題：Buckling and Crumpling of Virus Shells and  
Paper Sheets

Abstract: Virus capsids and crystalline surfactant vesicles are two examples of self-assembled shells in the nano- to micrometer size range. Virus capsids are particularly interesting since they have to sustain large internal pressures while encapsulating and protecting the viral DNA. Motivated by recent nano-indentation experiments of viral capsids by a scanning force microscope (SFM), we therefore study the mechanical properties of crystalline shells of icosahedral symmetry on a substrate under an uni-axial applied force by computer simulations. We predict the elastic response for small deformations, and characterize the buckling transitions at large deformations.

Buckling and crumpling also occur on macroscopic scales when thin elastic sheets, such as paper sheets or aluminum foil, are compressed by mechanical forces. In addition to the elastic properties of the material, determined by its resistance to bending and stretching, packing constraints are very important already at small compression. Computer simulations are employed to elucidate the effects of self-avoidance. We predict the power-law exponents of the force-compression curves and the patterns of folds in crumpled sheets. The results are compared with recent experiments.

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