SPECIAL SEMINAR

September 28, 2016: 11:00 AM

Shionogi 1F Community Hall, Hokkaido University

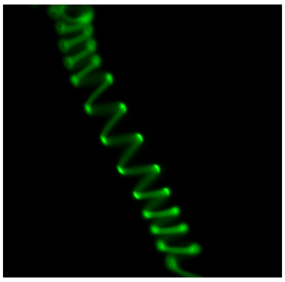
Elastocapillary deformations: preparing nanoparticle helices and understanding soft materials contact

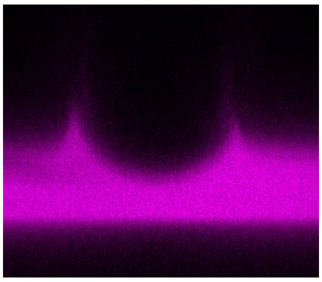
Dr. Jonathan T. Pham

Max Planck Institute for Polymer Research

Mainz, Germany.

phamj@mpip-mainz.mpg.de





Soft materials and flexible structures are versatile in their implementation as engineered materials, in food and cosmetic products, natural and synthetic biomaterials, or soft adhesives, for example. On small length scales, the effect of surface forces play a critical role in defining the mechanical behavior of soft materials. We demonstrate a unique mechanism that harnesses surface tension and elastocapillarity to prepare nanoparticle-based helical ribbons having nanoscale thickness, inorganic compositions as high as ~70%, and global mechanical properties similar to DNA and cholesteric helices. Second, we present recent work on microscale indentation of soft elastomers with moduli ranging from 5 to 400 kPa by colloidal probe atomic force microscopy. In these experiments, surface stress plays an essential role in mechanical behavior and thus we show that contact cannot be described by classical contact mechanics. Our results and analysis have important implications for understanding the deformation of soft materials and structures on a size scale where surface tension is a dominating force.

Host: Dr. Daniel R. King

Faculty of Advanced Life Science, Hokkaido University

Tel: 706-9016, E-mail: dking@mail.sci.hokudai.ac.jp

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