TAKAE LAB.

Universality and Diversity of Phase Transition

Department of Fundamental Engineering
Social Cooperation Program: Frost Protection Science

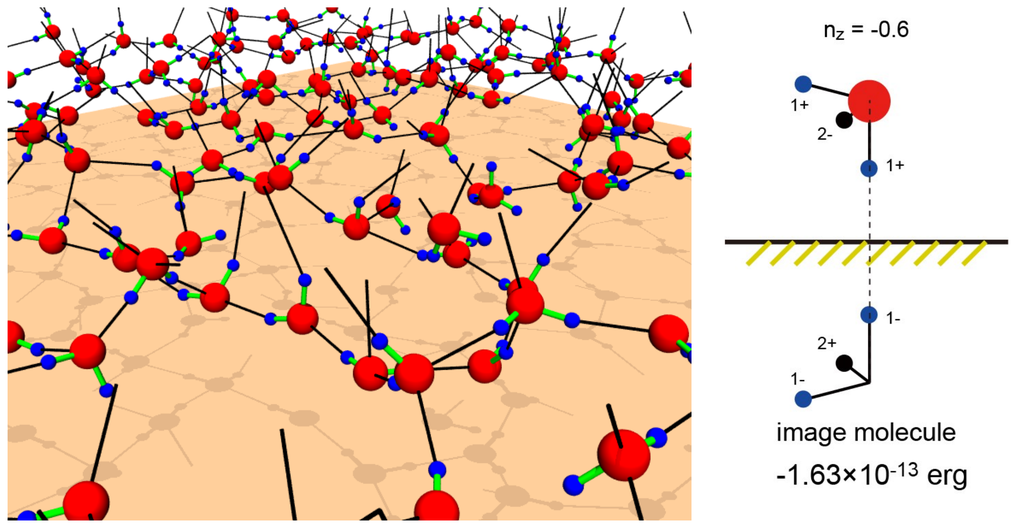
Soft Matter Science

https://www.iis.u-tokyo.ac.jp/~takae/

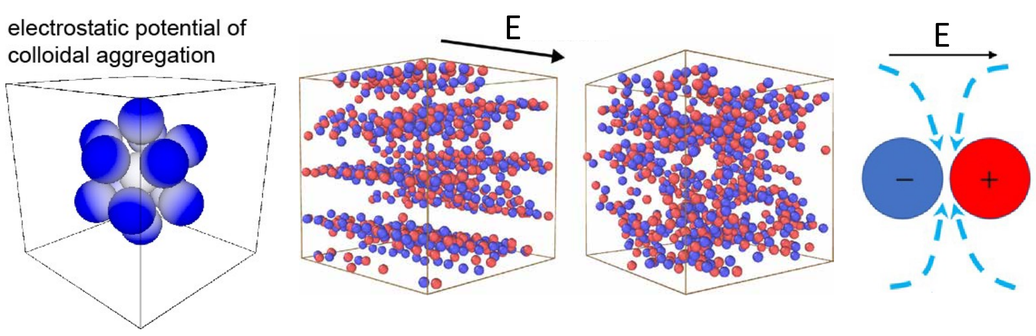
Physical principles of Phase Transition Dynamics

Phase transition such as water evaporation-condensation and frost formation has a strong influence on material properties. Many kinds of phase transitions have common feature (universality) and material specific feature (diversity) and key factors underlying them remain elusive in many systems. We develop simple molecular models and hydrodynamic models exhibiting phase transitions in soft matter, liquids, and solids to elucidate key factors controlling the emergence of material function due to violation of universality.

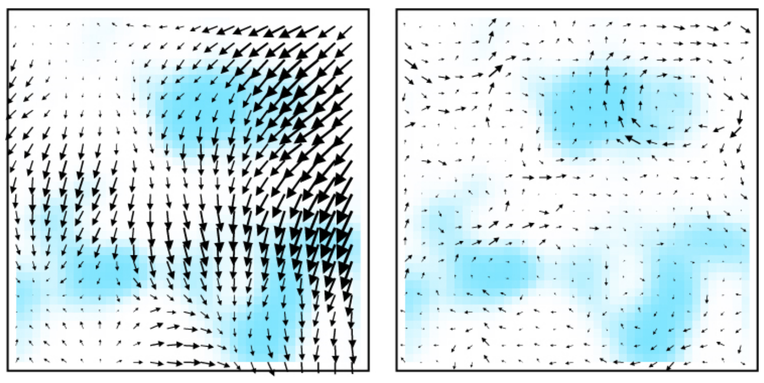
◆Dynamics in Liquids and Soft Matter



Molecular dynamics simulation of water structure and dynamics on a metal electrode

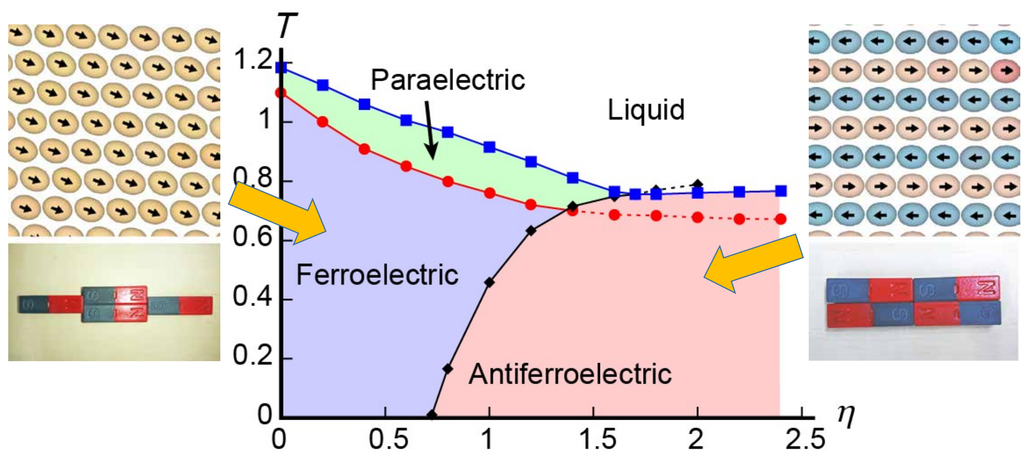


Inverse squeezing flow of charged colloidal solution

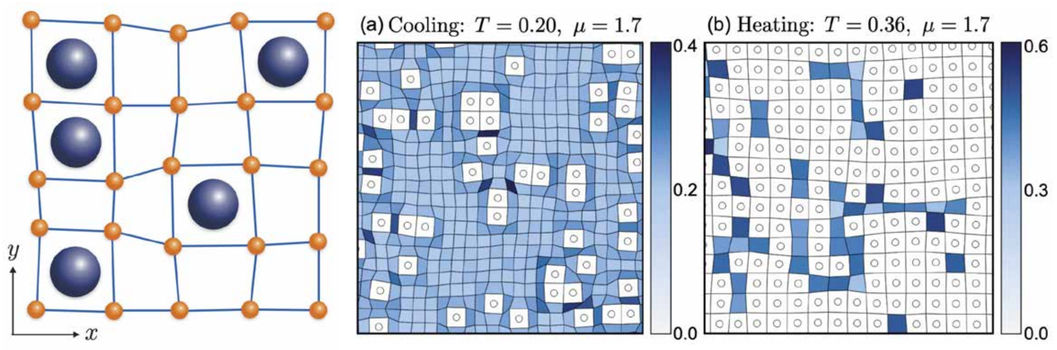


Hydrodynamics of liquid-liquid phase transition

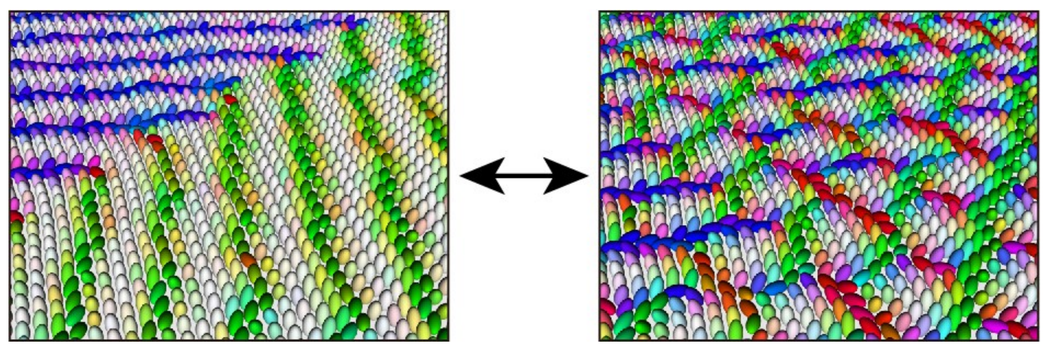
◆Control of phase transition in mechanically soft crystals



Ferroelectric-antiferroelectric phase transition with electromechanical responses



Elastic heterogeneity in a soft porous crystal



Topological phase transitions in chiral soft crystals