

Takae LAB.

[Universality and Diversity of Phase Transition]

Social Cooperation Program: Frost Protection Science



Soft Matter Science

Department of Fundamental Engineering

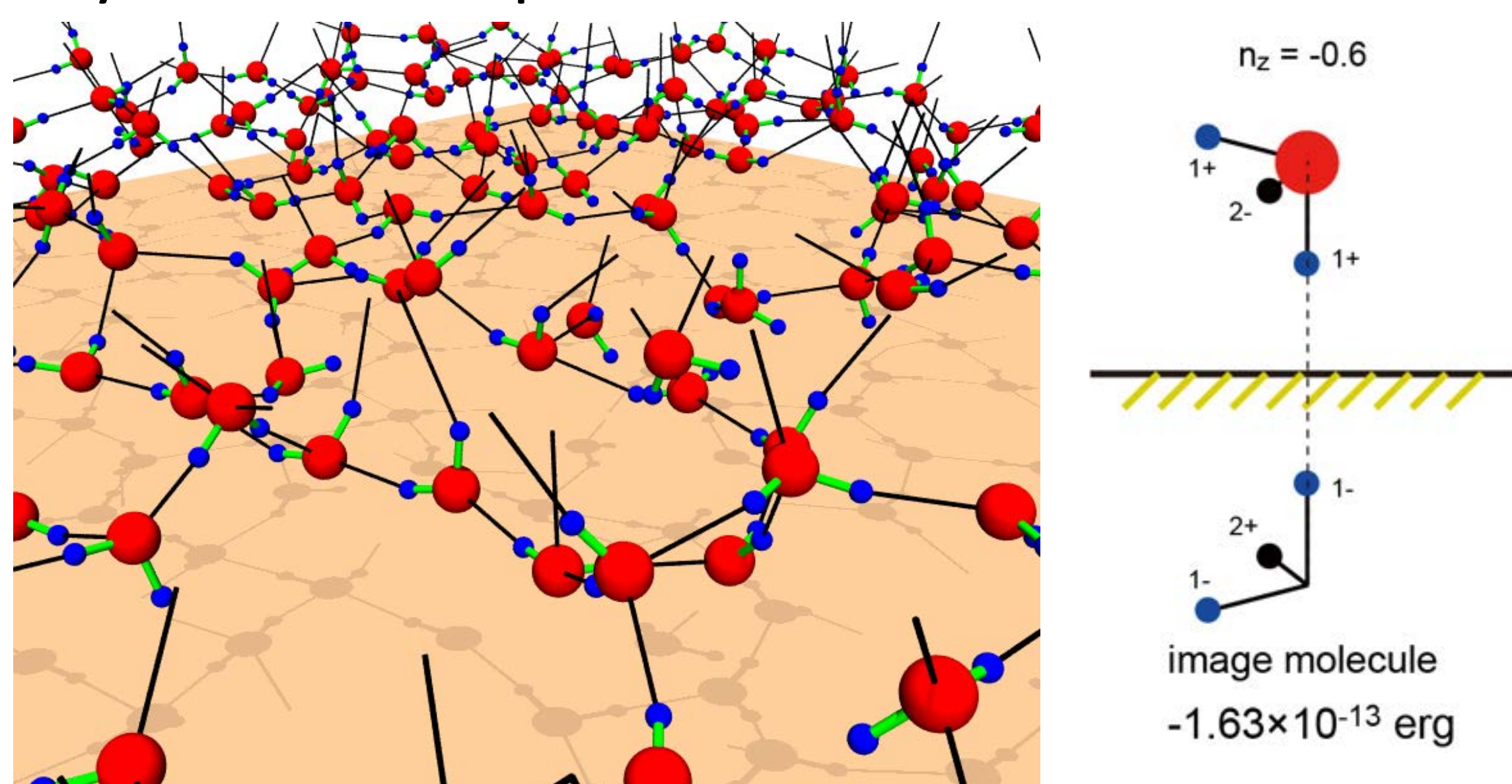
Social Cooperation Program: Frost Protection Science

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

Physical principles of Phase Transition Dynamics

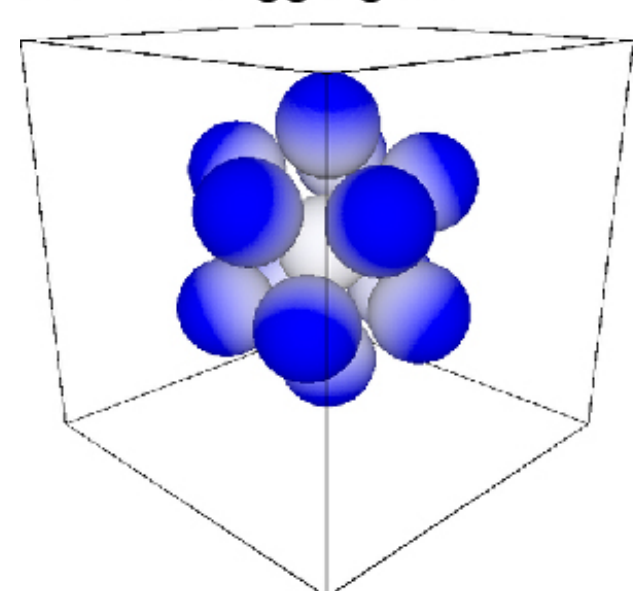
Phase transition such as water evaporation-condensation and frost formation has a strong influence on material properties. Many kinds of phase transitions have common feature (universality) and material specific feature (diversity) and key factors underlying them remain elusive in many systems. We develop 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

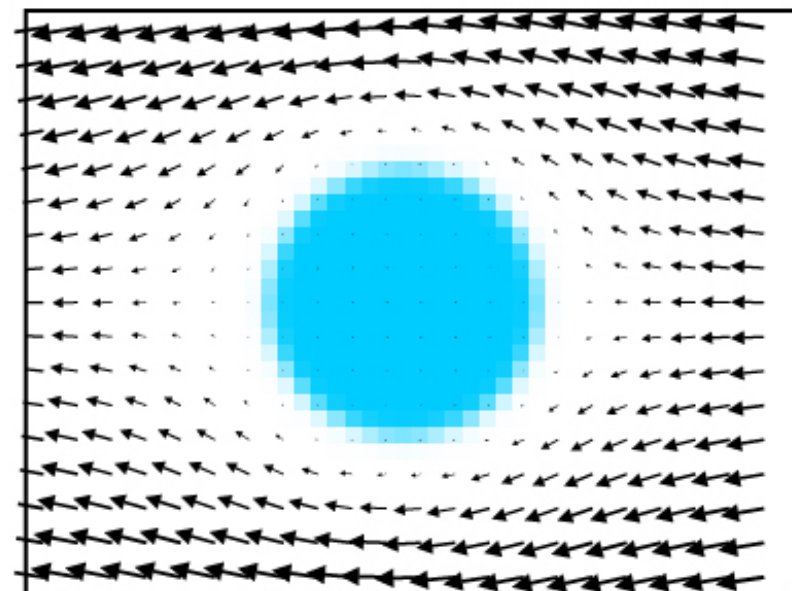


Molecular dynamics simulation of water structure and dynamics on a metal electrode

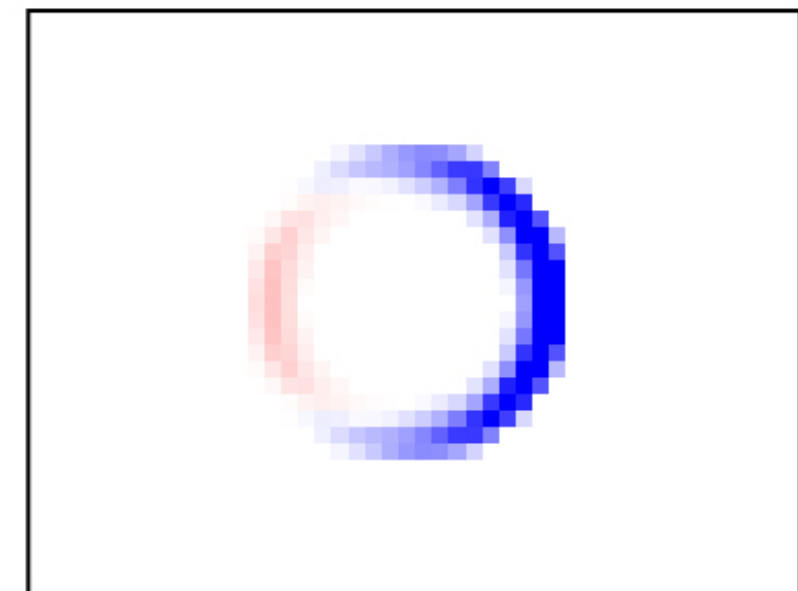
electrostatic potential of colloidal aggregation



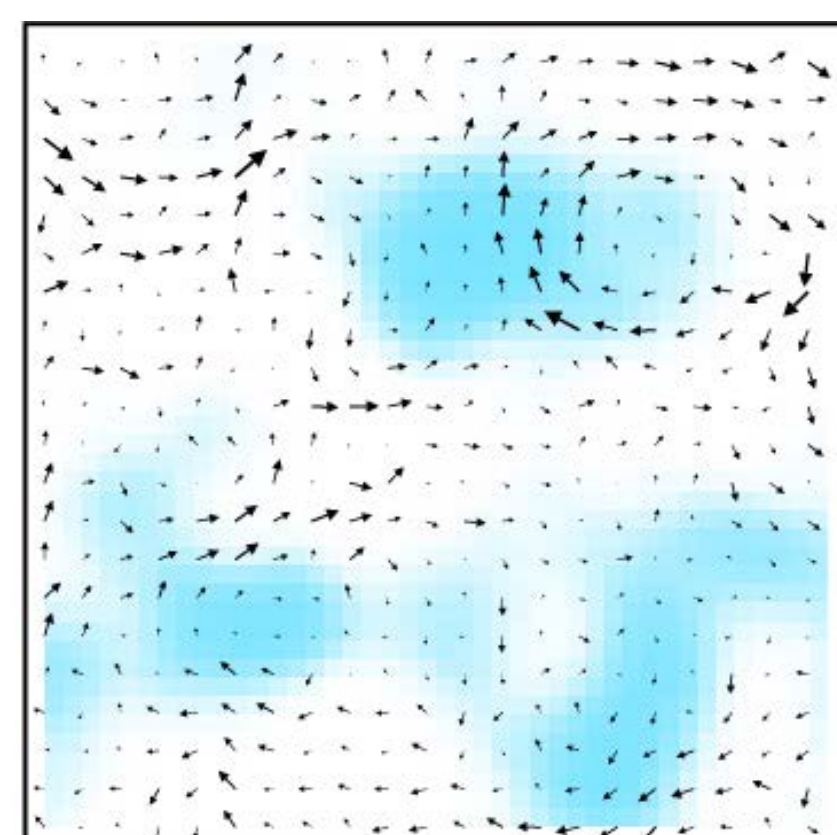
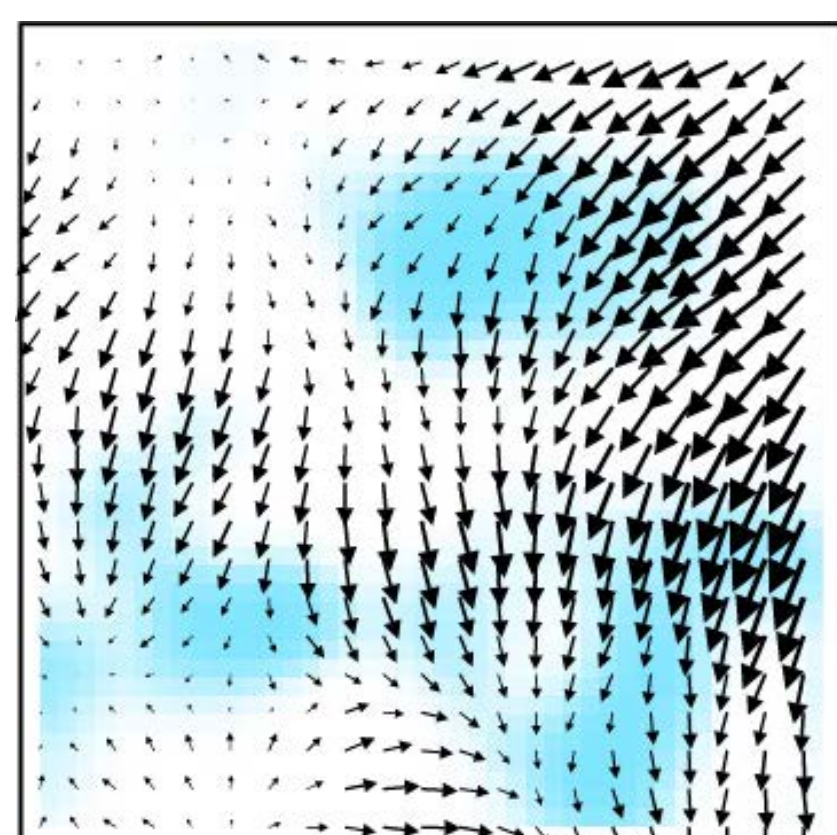
(a) fluid flow under external field



(c) surface charge

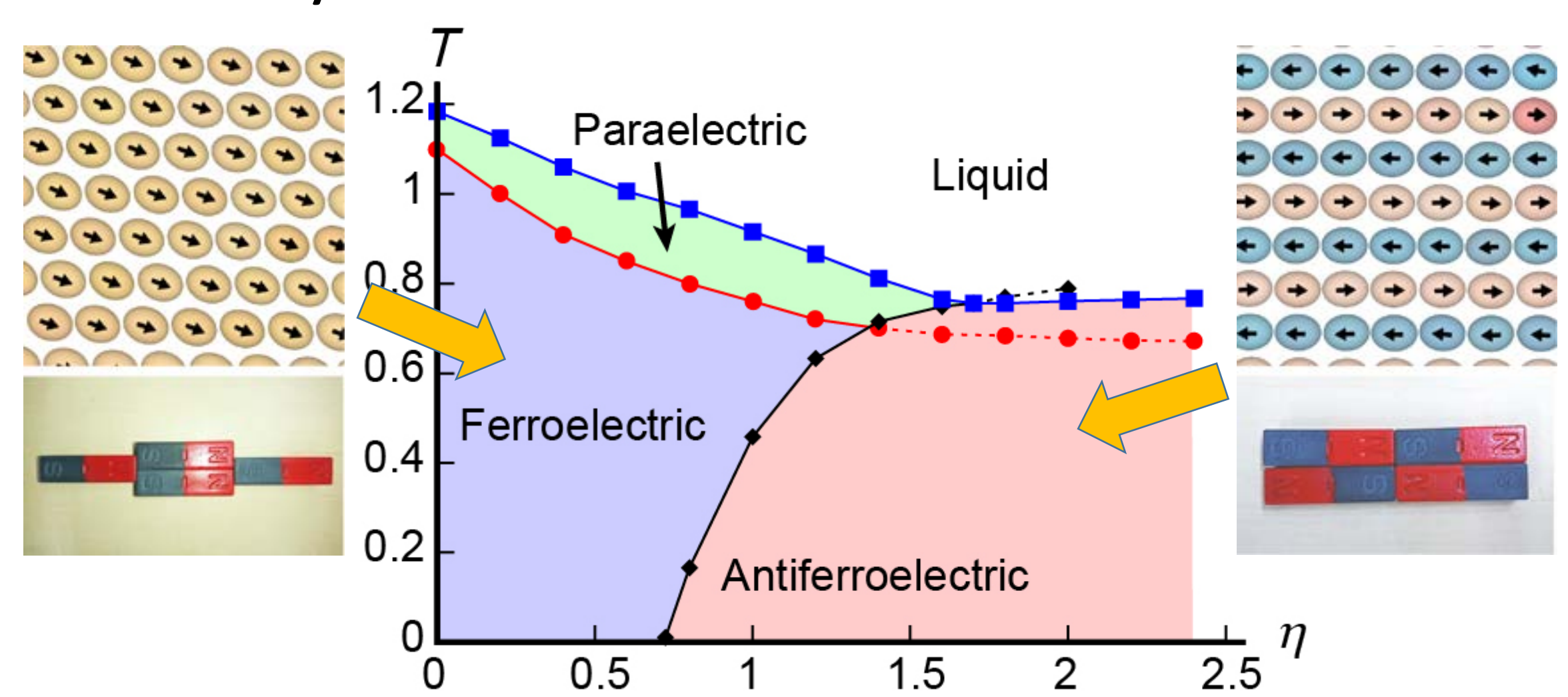


Self-organization in charged colloidal solution

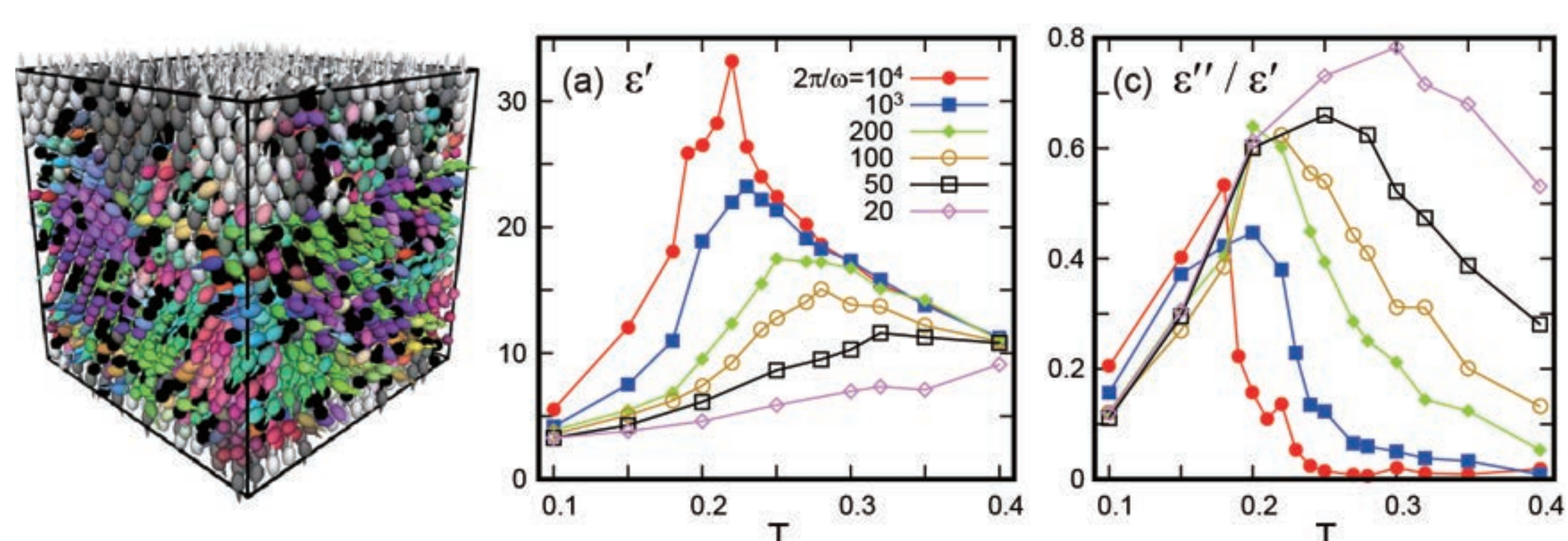


Hydrodynamics of liquid-liquid phase transition

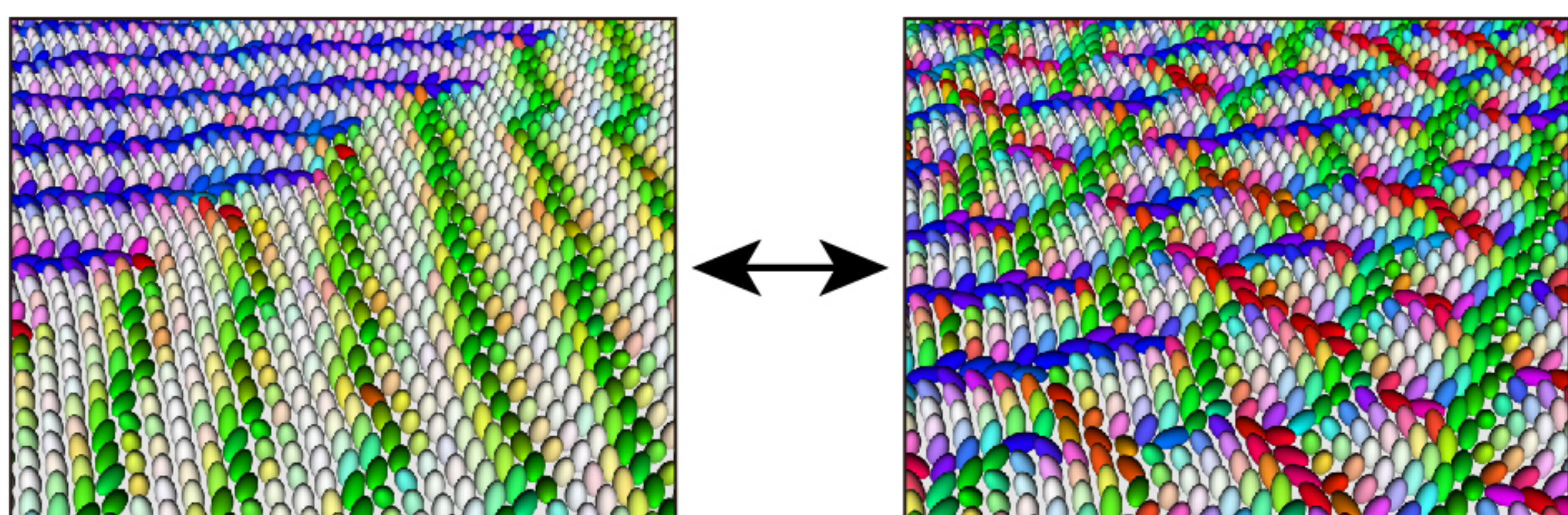
◆ Control of phase transition in mechanically soft crystals



Ferroelectric-antiferroelectric phase transition with electromechanical responses



Dielectric dispersion in disordered crystals



Topological phase transitions in chiral soft crystals