
研究会報告

YITP-W-07-03

**New Frontiers in Colloidal Physics:
A Bridge between Micro- and Macroscopic Concepts in Soft Matter**

日時：2007年7月25日(水)–7月27日(金)

場所：京大会館 101号室, 102号室 (〒606-8305 京都市左京区吉田河原町 15-9)

内容：

「コロイド」という言葉は元来、固体でも液体でもない物質を指すものとして生まれ、現在では、ある微粒子または液滴が他の相に分散した物質状態の総称として使われている。我々の身の周りには、塗料・食品・接着剤など非常に多くのコロイドが存在し、日常生活にとって必要不可欠な物質群となっている。コロイド科学は、古くから界面化学・応用化学・生化学など、主に化学・工学の分野で研究がなされてきた。しかしながら、マクロな物性を記述するためには物理学の概念・手法が極めて有効で、近年、新しい統計物理学の対象として物理の視点から活発に研究がおこなわれるようになった。さらに、ここ数年における実験・理論・数値計算の技術の著しい進歩に伴い、コロイド物理は新たな局面を迎えつつある。今研究会は、高分子・液晶などのソフトマターの一つとして扱われてきたコロイド物理学の最近の成果をまとめ、また化学・生物学など異分野で培われてきた研究と知識を融合することで、新たなコロイド物理に発展につなげることを目指したものである。

3日間の研究会は、150名を越す参加者（うち外国人26名）を集め、盛会の内に終了した。W. van Meegen (RMIT, Australia), G. Gompper, J. Dhont (ともに Forschungszentrum Jülich, Germany), P. Chaikin (New York Univ., USA), A. Ajdari (Saint-Gobain, France), D. Chan (Melbourne Univ., Australia), 大沢文夫 (愛知工大), 東谷公 (京大), 辻井薫 (北大) 各氏による9件の招待講演と11件の一般講演、また87件のポスター発表が行われた。統計物理に関する基礎的な研究から応用に関わるものまで、同じ土俵・同じ言葉で活発な議論できたことは、コロイド物理・ソフトマター物理にとって大きな意味があったものと思われる。また近年開発された様々な手法に基づく研究の発表が多くなされ、改めてコロイド物理・ソフトマター物理は、新たな局面を迎えていることを実感されられるものであった。

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YITP Workshop 2007
New Frontiers in Colloidal Physics:
A Bridge between Micro- and Macroscopic Concepts in Soft Matter
July 25-27, 2007 (Kyodai-Kaikan, Kyoto, Japan)

Auditorium 101 (1F)

Wednesday, July 25th

- 13:00- Opening address
Takeaki Araki (The University of Tokyo)
- 13:00-14:15 Chair: Paddy Royall (The University of Tokyo)
- 13:05- The first order "freezing" transition and the glass transition in a suspension of hard spheres. Are these transitions connected?
William van Meegen (Royal Melbourne Institute of Technology, Australia)
- 13:50- Shearing liquid-vapour interfaces: Phase separation and fluctuations
Didi Derks (Ecole Normale Supérieure, France)
- 14:15- --- Break (15min)---
- 14:30-15:40 Chair: Shinpei Tanaka (Hiroshima University)
- 14:30- How the ionic layer between silica surfaces in solutions affects their macroscopic friction
Ko Higashitani (Kyoto University)
- 15:15- Adhesion-induced lateral phase separation of multi-component membranes
Mesfin Asfaw (National Central University, Taiwan)
- 15:40- --- Break (15min)---
- 15:55-17:00 Chair: Tohru Okuzono (The University of Tokyo)
- 15:55- Microfluidics for the studies of complex fluids
Armand Ajdari (Saint Gobain, France)
- 16:40- Memorial talks : Prof. P. G. de Gennes
Masao Doi (The University of Tokyo)
Ko Okumura (Ochanomizu University.)

Thursday, July 26th

- 9:30-10:40 Chair: Hisao Hayakawa (Kyoto University)
- 9:30- Fractal structures and their functional properties
Kaoru Tsujii (Hokkaido University)
- 10:15- Collective motion of granular particles induced by moving interfaces (25min)
Yoshihiro Yamazaki (Waseda University)
- 10:40- --- Break (15min)---
- 10:55-11:40 Chair: Masao Doi (The University of Tokyo)
- 10:55- Behaviors of colloidal particles in macromolecular solutions; Mesoscopic phase in space and in time
Fumio Oosawa (Aichi Institute of Technology)
- 11:40- --- Break (80min)---
- 13:00- Free discussion
- 13:30- Poster Session 1 (75min)

14:45- --- Break (30min)---
 15:15- Poster Session 2 (75min)
 16:30- Free discussion

 18:00- Party (buffet-style) (Kyodai-Kaikan, room 210)

Friday, July 27th

9:00-10:10 Chair: Jun-ichi Fukuda (AIST)
 9:00- Vesicles and cells in hydrodynamic flow (45min)
Gerhard Gompper (Forschungszentrum Jülich, Germany)
 9:45- Direct numerical simulations of colloidal dispersions under external force
Ryoichi Yamamoto (Kyoto University) (25min)
 10:10- --- Break (20min)---
10:30-11:40 Chair: Masayuki Imai (Ochanomizu University)
 10:30- Analysis of the intralayer molecular orientation in the B1 phase
 of a bent-core liquid crystal molecule using X-ray microbeam
Yoichi Takanishi (Kyoto University)
 10:55- Measuring and modelling forces and deformations in soft matter
Derek Y. C. Chan (The University of Melbourne, Australia)
 11:40- --- Break (80min)---
13:00-14:35 Chair: Takashi Taniguchi (Yamagata University)
 13:00- Random organization
Paul Chaikin (New York University, USA)
 13:45- A plug-in electric plate for micro assembly of colloidal mixtures
Hiroshi Frusawa (Kochi University of Technology)
 14:10- Memory of flow in paste and its visualization as crack pattern
Akio Nakahara (Nihon University)
 14:35- --- Break (25min)---
15:00-16:45 Chair: Yuichi Masubuchi (Kyoto University)
 15:00- Micellar/lamellar phase separation processes in a nonionic surfactant/water system
Tadashi Kato (Tokyo Metropolitan University)
 15:25- Nonlinear rheology of soft glassy materials
Kunimasa Miyazaki (Kochi University of Technology)
 15:50- Shear banding of complex fluids
Jan K. G. Dhont (Forschungszentrum Jülich, Germany)
 16:35- Closing remarks
Akira Onuki (Kyoto University)

Poster session 1

Thursday, July 26th 13:30-14:45

1. Fluctuation rheology using a polymer
David Lu (National Taiwan University, Taiwan)
2. Layering phenomena driven by rotating magnetic field in ferrofluid
Yuko Yamada (Nagoya Institute of Technology)

3. Thermally induced unidirectional crystallization of charged colloids
Akiko Toyotama (Nagoya City University)
4. Toy endocytosis
Feng-Ching Tsai (National Central University, Taiwan)
5. Phase diagram of self-propelling particles in two dimension
You-Cheng Lai (National Central University, Taiwan)
6. Core-shell structure in semiflexible-flexible block copolymers
Natsuhiko Yoshinaga (The University of Tokyo)
7. Demulsification of O/W emulsion under by electrostatic field
Tsuneki Ichikawa (Hokkaido University)
8. Dynamical structure of nano-meter-sized domains on a vesicle
Masayuki Imai (Ochanomizu University)
9. Reciprocal relation of charged particle with thin electric double layer
Masato Makino (JST)
10. Correlation between dynamic heterogeneity and medium-range order in two-dimensional glass-forming liquid
Takeshi Kawasaki (The University of Tokyo)
11. Kinetics of the morphological transition of diblock copolymer micelles by the dynamic density functional simulation
Takashi Uneyama (Kyoto University)
12. Formation of stable disk-fused vesicle in DMPC/DHPC lipid mixture system
Norifumi Yamada (KEK)
13. Electrostatic analysis of chiral phase separation in a dipolar monolayer domain : Perturbation analysis
Tetsuya Yamamoto (Tokyo Institute of Technology)
14. Adsorption dynamics in Pickering emulsions
Shigeyuki Komura (Tokyo Metropolitan University)
15. Tension-induced morphological transition in mixed lipid bilayers
Naofumi Shimokawa (Tokyo Metropolitan University)
16. withdrawn
17. Violation of the incompressibility of liquid by simple shear flow
Akira Furukawa (The University of Tokyo)
18. Structural analysis of Im3m phase of BABH-n by maximum entropy method
Kazumi Ozawa (Tukuba University)
19. Coarse-grained simulation of microphase separation: Roles of hydrodynamics in cylindrical ordering
Kaname Watariguchi (The University of Tokyo)
20. Measurement of interparticle force between colloidal particles in nematic liquid crystal by optical tweezers
Kenji Takahashi (Kyushu University)
21. Pattern formed by phase separation in the mixture of nematic liquid crystal and polymer
Kosuke Kita (Kyushu University)
22. Effects of molecular weight and ionic strength on the adsorbing dynamics of polyelectrolyte chains onto colloidal particles
Yasuhisa Adachi (Tukuba University)
23. Controlling excitable waves in cultured cardio myocyte
Marcel Horning (Kyoto University)

24. Sedimentation of binary colloids: Brazil nuts and icebergs
Mathieu Leocmach (The University of Tokyo)
25. Discontinuous enhancement of crystal growth below glass transition
Takashi Konishi (The University of Tokyo)
26. Particle model for fluid membrane with fluctuating spontaneous curvature
Tamotsu Kohyama (Shiga University)
27. The molecular dynamics simulation of inclusion complex formation
Naohito Urakami (Yamaguchi University)
28. Protein crystallization induced by poly(ethylene) glycol: A small angle X-ray scattering study
Shinpei Tanaka (Hiroshima University)
29. Numerical simulation of mesoscale patterns using maximum entropy method for the boundary condition
Hiroto Ogawa (Tohoku University)
30. Structure analysis of jungle-gym type gel by Brownian dynamics simulation
Masako Takasu (Kanazawa University)
31. In situ observation on hierarchical actin bundle networks
Tomomi Masui (JAEA)
32. Elasticity of entangled polymer liquids: from F-actin to polyethylene via primitive path analysis
Nariya Uchida (Tohoku University)
33. Finite-size scaling for non-linear rheology of fluids confined in a small space
Michio Otsuki (Kyoto University)
34. The long time tails of granular fluids
Hisao Hayakawa (Kyoto University)
35. Two approaches simulating Brownian motion in fluid suspensions
Yasuya Nakayama (Kyushu University)
36. On the toroid-spherical globule transition of the DNA condensation
Yukitaka Ishimoto (Okayama Institute for Quantum Physics)
37. Domain induced budding in buckling membranes
Kohtaro Yamada (Tokyo Metropolitan University)
38. Stress fluctuation calculated from DNA fluorescent images
Yuichi Masubuchi (Kyoto University)
39. Dynamics of isotropic order - New class of super cooling state -
Jun Yamamoto (Kyoto University)
40. withdrawn
41. Lamellar-lamellar phase separation in phospholipid/salt/water system
Mafumi Hishida (Kyoto University)
42. Wetting dynamics with evaporation and condensation
Ryohei Teshigawara (Kyoto University)
43. Theoretical study of phase separation in electrolytes
Akihiko Minami (Kyoto University)
44. 8CB liquid crystal as fast calibration media for micro-thermal device
Frederic Gillot (CIRMM/LIMMS)

Poster session 2

Thursday, July 26th 15:15-16:30

1. Configuration of a chiral smectic-C film with a circular inclusion-- Pathological contribution of spontaneous bend? --
Jun-ichi Fukuda (AIST)
2. Unidirectional crystallization of charged colloids driven by diffusion of base
Junpei Yamanaka (Nagoya City University)
3. Nucleation kinetics in Krafft transition
Shigeo Sasaki (Kyushu University)
4. How strong is the adhesion cluster between two plates???
Chih-Chao Tang (National Central University, Taiwan)
5. "Average structure" of a ring polymer with the trefoil knot
Shinya Saka (Keio University)
6. Wetting transitions on textured surfaces
Chieko Ishino (Ochanomizu University)
7. Fate of a two-dimensional bubble
Ayako Eri (Ochanomizu University)
8. Adhesion of binary vesicles induced by phase separation
Yuka Sakuma (Ochanomizu University)
9. Modeling of drying processes of polymer solutions
Tohru Okuzono (The University of Tokyo)
10. Nematic-crystal phase separations in liquid crystal colloids
Akihiko Matsuyama (Kyushu Institute of Technology)
11. Nonequilibrium dynamics of polymer translocation and straightening
Takahiro Sakaue (Kyoto University)
12. Shape deformation of ternary vesicles with various shapes
Miho Yanagisawa (Ochanomizu University)
13. Concentration effects on sedimentation of self-similar clay-flocks
Setsuo Ooi (National Institute for Rural Engineering)
14. Adsorption of Janus particles to curved interfaces
Yuichi Hirose (Tokyo Metropolitan University)
15. Stacking disorder in hard sphere crystal under gravity
Atsushi Mori (Tokushima University)
16. Effects of hydrodynamic interactions on a coil-globule transition of a single polymer
Kumiko Kamata (The University of Tokyo)
17. Glassy behavior of two-dimensional driven granular matter
Keiji Watanabe (The University of Tokyo)
18. Experimental study of lateral diffusion on the bilayer membrane
Masatoshi Ichikawa (Kyushu University)
19. A toroidally folded monomolecular DNA chain-from the perspective of colloidal physics-
Takafumi Iwaki (Okayama Institute for Quantum Physics)
20. Control of self-assembly patterns formed in liquid crystal-polymer mixture
Hiroshi Kawafuji (Kyushu University)
21. Conformation and dynamics of a single DNA molecule confined by walls

- Hitoshi Uemura** (Kyushu University)
22. Stretching single molecular DNA by temperature gradient
Hong-Ren Jiang (The University of Tokyo)
23. Super-elastic collisions in a thermally activated system
Hiroto Kuninaka (Chuo University)
24. Fracture of soft cellular solids
Ko Okumura (Ochanomizu University)
25. Lattice Boltzmann simulation of the dispersion of aggregated Brownian particles in shear flows
Shugo Yasuda (Kyoto University)
26. Indirect interaction dynamics of barchan dunes
Atsunari Katsuki (Nihon University)
27. Field theoretical approach to the glass transition
Takahiro Nishino (Kyoto University)
28. Controlling topological defect in nematic liquid crystal with focused laser
Masahiro Kojima (Kyoto University)
29. Properties of a liquid crystal (8CB) confined into unidirectional nanopores
Regis Guegan (The University of Tokyo)
30. Salt concentration dependence of counterion condensation in sodium polystyrene sulfonate brush
Takuya Fujima (Nagoya University)
31. Control parameter dependence of the work in a process under stochastic control
Hiroyuki Suzuki (Keio University)
32. Dynamics and structure in colloidal fluids, clusters and gels at the single-particle level
Paddy Royall (The University of Tokyo)
33. Preparation and characterization of self-assembled conducting polymer nanofibers
Sadaki Samitsu (Kyoto University)
34. Ia3d-cubic phase and its thermal transition to and from an Im3m-cubic phase of BABH-n
Shoichi Kutsumizu (Gifu University)
35. Power-law behavior at the order-disorder transition of colloidal suspensions
Masamichi Miyama (The University of Tokyo)
36. Bending modulus of lipid bilayers in the state of anomalous swelling
Hideki Seto (Kyoto University)
37. Depletion layer near a wall in polyelectrolyte solutions
Takashi Taniguchi (Yamagata University)
38. Fluctuation of drift velocity in electrophoresis of charged particles
Takeaki Araki (The University of Tokyo)
39. withdrawn
40. Specific wetting patterns probed with biomimetic droplets
Jacques Fattaccioli (The University of Tokyo)
41. Surface force properties of polystyrene latex particles in ionic surfactant solutions
Masatoshi Fujii (Shimane University)
42. Dynamics of kinetic arrest in a model jamming system
David Head (The University of Tokyo)
43. Nonequilibrium mechanics of active cytoskeletal networks
Daisuke Mizuno (Kyushu University)