Colloid and interface chemistry

Developments of functionalized amphiphilic molecules and active control of interfacial properties

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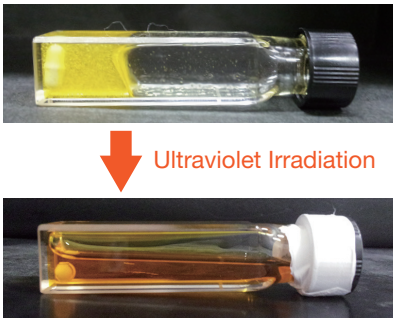
Purpose of Research

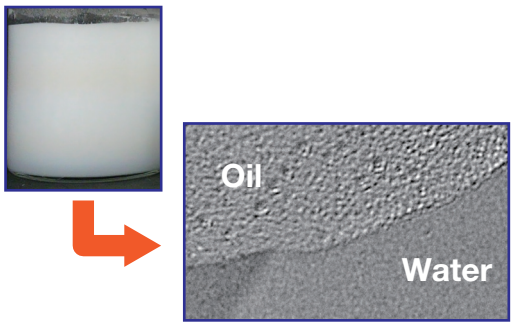
Every material has an "interface." The key point of the "interface chemistry" is to freely control the interfacial properties by selectively using (or molecularly designing) suitable amphiphilic material. Our laboratory aims at developing functionalized amphiphilic material (surfactant) and achieving precise control of various interfaces with such material.

Summary of Research

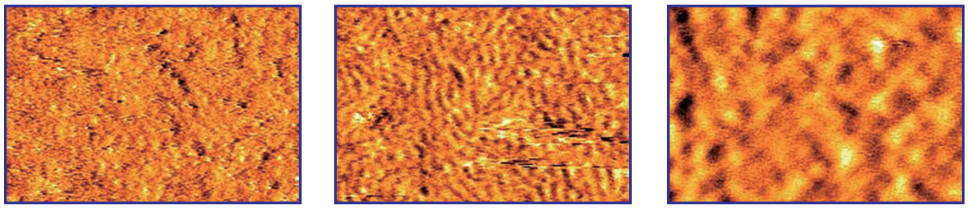
1) Developing novel amphiphilic materials (Gemini type, amino acid-based, stimulus-responsive, or polymerizable surfactant)
2) Preparing emulsion focused on saving resources and energy
3) Analyzing adsorption of amphiphilic material at a solid-liquid interface (experimental analysis using atomic force microscope, quartz crystal microbalance and friction force measurements)



Photoviscosity Control of Stimulus-responsive Surfactant Solution



TEM Image of Emulsion Sample



AFM Images of Surfactant Adsorption Layer Formed at Solid-liquid Interface

Points

- **We have developed the amphiphilic material which is eco-friendly or has distinctive additional values**
- **Correct understanding of properties of the amphiphilic material leads to appropriate formulations in product development**
- **We expect to assist to solve the problems occurred during development works by evaluating or analyzing interfacial phenomenon**

Comparison with Conventional or Competitive Technology

Out laboratory has advanced research on interfacial phenomenon in order to take advantage of obtained information in manufacturing. We also willingly accept the collaborative project with private companies to share the research results for the common good, while emphasizing basic research.

Expected Applications

- Developing surfactants (detergent, emulsifier, dispersant, thickening agent, lubricant additive, etc.)
- Developing formulations using the surfactants (cosmetics, foods, medicaments, paint, ink, etc.)
- Developing particle dispersion system (emulsion or suspension)

What We Expect from Companies

We are finding the company as a collaborative project partner. We are also willing to offer tech support if you want more information on interface chemistry.

Future Developments

We want to approach complicated boundary study fields (e.g. tribology) from the aspect of interface chemistry.

■ Awards:
Innovation Award (2012) in Oil Technology of Japan Oil Chemist's Society
Best Paper Awards (2010)
CSI Medallion of Japan Society of Colour Material (2007)

■ Intellectual Property:
Japanese Unexamined Patent Application Publication No. 2011-131137
"Cationic Surfactant, Blend Composition of Anionic/Cationic Surfactants and Hair Cosmetics"