Introduction

In this poster, we present an overview of cryogenic electron microscopy (cryo-EM) techniques established at LCI Characterization Facility for soft-matter materials (e.g., bio-materials, liquid crystals, oils, and polymers). These materials often impose great challenges for electron microscopy studies due to the weak contrast, difficulties in specimen preparations and radiation damage. As in situ electron microscopy techniques are still not practical at the current stage, cryo-EM techniques are often considered to be a desired choice for many soft-matter materials.

Generally available Cryo-techniques for soft-matter materials

- Plunge freezing
- Freeze substitution
- Freeze fracture
- High pressure freezing
- (cryo-) Ultramicrotome

Cryo-TEM

RT-TEM

Thin film plunge-freezing and cryo-TEM

Lipid Vesicles

UV exposure


Suspended lyotropic chromic liquid crystal (nematic phase): side-view (a) and top-view (b) of the of the aggregates. See J. Mater. Chem. C, 2014,2, 8780-8788 for details.

Cryo-ultramicrotomy and cryo-TEM

High-pressure frozen lyotropic chromic DSC: side-view (a) and top-view (b) of the aggregates. Microscopy Research and Technique, 77, p.754-772 (2014)

Freeze fracture and RT-TEM


Application examples

Other techniques @ LCI Characterization Facility

- High Speed Camera (HS-camera)
- FTIR microscope
- Confocal scanning laser microscope
- Abbe Refractometer
- Differential Scanning Calorimeter (DSC)

Website: http://www.lcnet.kent.edu/organization/facility/characterization/index.php

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