

2019 Microscopy/Microanalysis Summer School at Advanced Materials and Liquid Crystal Institute

- **Time:** July 18 – 19, 2019
- **Location:** Advanced Materials and Liquid Crystal Institute, Kent State University, Kent, OHIO 44242
- **Free Pre-Registration:** Click [here](#).
- **Contact:** Min Gao mgao@kent.edu; Lu Zou lzou@kent.edu

Instructors

- ❖ Dr. Greta Babakhanova (NIST)
- ❖ Dr. Min Gao (KSU)
- ❖ Dr. John Kelly (Zeiss)
- ❖ Dr. Andrew Knoll (UA)
- ❖ Mr. Taras Turiv (KSU)
- ❖ Dr. Jing-Jiang Yu (Hitachi)

Topics

- ❖ Digital Holographic Microscopy (DHM)
- ❖ Cryo-Ultramicrotomy
- ❖ X-Ray Microscopy (XRM)
- ❖ Surface Spectroscopy
- ❖ Polarized Light Microscopy (PLM)
- ❖ Atomic Force Microscopy (AFM)
- ❖ Electron Microscopy (TEM/SEM)

KENT STATE
UNIVERSITY

Advanced Materials and
Liquid Crystal Institute

ZEISS

NIST

The
University
of Akron



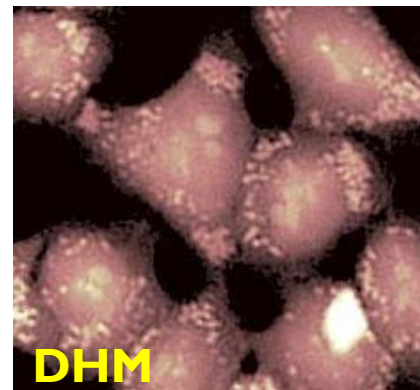
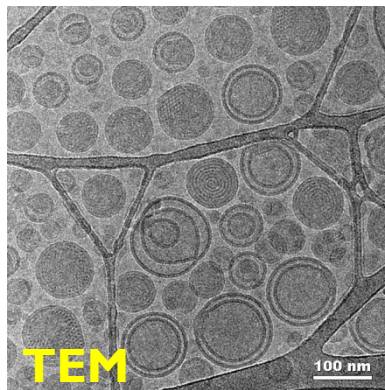
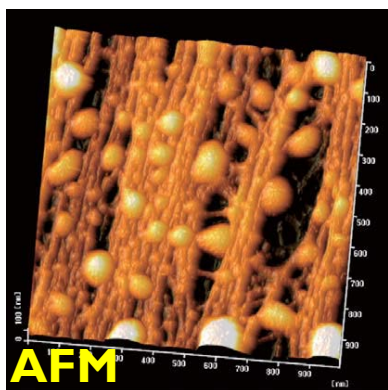
Established in 1966



Akron Council of Engineering
and Scientific Societies

Incorporated 1946

HITACHI
Inspire the Next



AMLCI Characterization Facility Summer School 2019: Microscopy and Microanalysis Techniques

Schedule

	7/18	7/19
9:00 – 9:30	Registration	Sign in
9:30 – 9:40	Opening	Today's preview
9:40 -10:30	Basic AFM	X-Ray Microscopy
10:40-11:30	AFM Application on Polymers	PLM and application on liquid crystals
1:00 – 1:50	(Cryo-)Ultramicrotome	Basic DHM
2:00 – 2:50	Surface Spectroscopy	DHM Applications
3:00 – 5:00	Demos on <ul style="list-style-type: none"> • TEM/SEM (Rms. 106/108) • AFM (Rm. 109) 	Demos on <ul style="list-style-type: none"> • R-DHM (Rm. 170) • T-DHM (Rm. 109) • Cryo-ultramicrotomy (Rm. 106A)

• **Dr. Greta Babakanova (NIST):** *Digital Holographic Microscopy (DHM) & applications*

The first part of this presentation will focus on the physical principles of digital holographic microscopy technique. We will introduce transmission (T) and reflection (R) DHM modes. In the second part of the lecture, we will discuss the applications of this instrument. Lastly, the lecture will be concluded with discussion about possible sample types as well as a demonstrations of both, R-DHM and T-DHM systems.

• **Dr. Min Gao (KSU):** *(Cryo-)Ultramicrotomy*

In the presentation/demonstration, we are going to focus on the practical aspect of (cryo-)ultramicrotomy in addition to a brief summary of the basics and recent developments. We'll cover how to work on different materials (temperature selection, sample size, etc.), how to obtain ribbons, how to maintain diamond knives (one of the most crucial parts), how to collect sectioned slices, etc.

• **Dr. John Kelly (Zeiss):** *Introduction to X-ray Microscopy (XRM): Technology and Applications for Lab-based Non-destructive, High-resolution 3D Imaging and Analysis*

Recent advances in X-ray microscopy (XRM) instrumentation and methods have opened the door for a variety of new opportunities in 3D characterization and visualization. Specifically, the high resolution and high contrast of these microscopes have been successfully applied to samples from the life sciences, materials science, electronics, and geosciences fields, covering a wide range of low and high Z samples and sample sizes. This talk will cover an overview of XRM technology as well as prominent applications.

• **Dr. Andrew Knoll (UA):** *Surface Science Characterization*

An overview of surface science characterization methods focusing on X-ray photoelectron spectroscopy and some complimentary techniques. In particular, this talk will focus on combining multiple characterization techniques to better understand important surface parameters.

• **Mr. Taras Turiv (KSU):** *Polarized Light Microscopy (PLM): application in liquid crystal and life science.*

Mr. Taras Turiv will be covering basic description of the polarized light, phase retardation and birefringence of the materials. Principles of the polarized light microscopy, also basics of conoscopy and differential interference microscopy. Characterization of the optical axis orientation in the birefringent materials, basic idea behind the detection of topological defects in liquid crystals.

• **Dr. Jing-Jiang Yu (Hitachi-hta):** *Atomic Force Microscopy: Principles, Instrumentation and Applications;*

Current state of atomic force microscopy (AFM) and its framework of imaging modes will be reviewed. In addition, special development for ease of use and automatic image optimization will be presented. *Innovative Hitachi AFM Technologies for Enhanced Characterization of Polymers*

The emphasis will be made on the novel imaging mode as well as recent instrumentation advancements that allow for comprehensive and much enhanced AFM examinations of polymer complex.