WORKSHOP # 14 - Wednesday, May 6, 2026

Advanced Characterization & Artificial Intelligence in high-precision Advanced manufacturing (AAA)

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(name listed in alphabetic order)

High-precision advanced manufacturing—including additive micro/nano-manufacturing (2PP, µCLIP, AJP, DLP, etc)—enables the fabrication of architected materials, devices, and systems with exceptional spatial and functional control. These approaches integrate advances in science, engineering, and computation to produce high-performance components for energy, microelectronics, biomedical, and quantum technologies. However, widespread adoption remains limited by lack of printable materials as well as incomplete understanding of the relationships among processing/postprocessing parameters, multiscale microstructural evolution, defect formation, and resulting material performance.

As part of Brookhaven National Laboratory's (BNL) Advanced Manufacturing Initiative (AMI), this workshop will convene researchers from national laboratories, academia, industry, and funding agencies to define research priorities and foster collaboration in high-precision advanced manufacturing. Integrating advanced synchrotron and nanoscale characterization at NSLS-II and CFN—particularly their multimodal *in situ/operando* capabilities—with AI-driven data analytics, the workshop will promote interdisciplinary dialogue and identify strategies to accelerate materials discovery, process optimization, qualification, and deployment (TRL 0 → TRL 10) toward predictive, closed-loop intelligent manufacturing.

The program will include invited talks, facility and beamline tours, and interactive discussions to promote collaboration and community building. **Expected outcomes:**

1. Identification of key scientific challenges and opportunities.
2. Alignment of characterization tools with AI-enabled modeling needs.
3. Development of a strategic roadmap linking academia, industry, funding agency, and national laboratories.

Invited Talks & Poster Session at SUSC		
Time (ET)	**Title**	**Speaker (Affiliation)**
9:00-9:05am	Opening Remarks	Zhongshu Ren (NSLS-II)
9:05-9:15am	Introduction of NSLS-II, NSLS-IIU & NEXT III	Andrew Kiss (NSLS-II)
9:15-9:30am	Processing Challenges of Solid Filled {Ceramic} Resins (Keynote)	John Koch (Admatec)
9:30-9:45am	3D nanoprinting using nanocluster-based photoresists	Wendy Gu (Stanford)
9:45-10:00am	Optofluidic 3D Micro-/Nanofabrication of Multi-Materials (virtual)	Mingchao Zhang (NUS)
10:00-10:15am	3D nanolithography with metalens arrays and spatially adaptive illumination (virtual)	Xiaoxing Xia (LLNL)

10:15-10:30am	Real-Time Insights from *in situ* Nanomechanical Testing	Eric Hintsala (Bruker)
10:30-10:45am	TBD	Rahul Panat (CMU)
10:45-11:00am	Break	
11:00-11:15am	NSF Funding Opportunities for Advanced Manufacturing (virtual)	Linkan Bian (NSF)
11:15-11:30am	AI enhanced Chemical Imaging Analysis at Nano X-ray Imaging Beamlines	Mingyuan Ge (NSLS-II)
11:30-11:45am	*In Situ* Imaging of Morphological & Chemical Evolution during µCLIP Postprocessing	Zhengtao Gan (ASU)
11:45am-12:00pm	Investigating Defects in Additively Manufactured Ceramics (virtual)	Tobias A Schaedler (HRL)
12:00-1:00pm	Lunch Break & Poster Session (SUSC)	
Facility Tours at CFN & NSLS-II		
1:00-1:15pm	Bus Transport from SUSC to CFN	
Time (ET)	**Tour**	**Host (Affiliation)**
1:15-1:25pm	Nanofabrication center at CFN	Ming Lu (CFN)
1:35-1:45pm	Full-field X-ray Imaging (FXI) Beamline at NSLS-II	Zhongshu Ren (NSLS-II)
1:50-2:00pm	Complex Materials Scattering (CMS) Beamline at NSLS-II	Siyu Wu (NSLS-II)
2:05-2:15pm	Coherent Diffractive Imaging (CDI) Beamline at NSLS-II	Garth Williams (NSLS-II)
2:20-2:30pm	Hard X-ray Nanoprobe (HXN) Beamline at NSLS-II	Ajith Pattammattel (NSLS-II)
2:35-2:45pm	Submicron Resolution X-ray Spectroscopy (SRX) Beamline at NSLS-II	Andrew Kiss (NSLS-II)
2:50-3:00pm	High Energy X-ray Engineering X-ray Scattering (HEX) Beamline at NSLS-II	Michael Drakopoulos (NSLS-II)
3:00-3:30pm	Break at NSLS-II	
Roundtable Discussion at NSLS-II		
3:30-4:55pm	Roundtable Discussion	
4:55-5:00pm	Closing Remarks	Zhongshu Ren (NSLS-II)
5:00-5:15pm	Bus Transport from NSLS-II to SUSC	