



Preview: 2020 Materials Research Society Spring Meeting & Exhibit

Phoenix Convention Center, Phoenix, Arizona • Meeting: April 13–17 • Exhibit: April 14–15
mrs.org/spring2020

The 2020 Materials Research Society (MRS) Spring Meeting will be held at the Phoenix Convention Center (PCC), Phoenix, Arizona, April 13–17. The symposium sessions will include many new and developing areas of materials research, as well as some well-established and popular topics. To complement the symposium sessions, 10 tutorials will provide detailed introductions to select areas of research, and the exhibit will showcase products and services of interest to the scientific community. The Meeting, exhibits, and posters will all be located at the PCC.

Symposium Sessions

Making up the core of the Meeting are five topical clusters of the technical program, encompassing 56 symposia. They are grouped as follows: **Characterization and Theory**; **Electronics and Photonics**; **Energy, Storage and Conversion**; **Nanoscale and Quantum Materials**; and **Soft Materials and Biomaterials**.

LATE NEWS—HOT TOPIC coverage will feature: artificial intelligence; responsive and adaptive materials; sustain-

ability; emerging biomaterials (synthetic biology, 3D biology, and bioelectronics); quantum materials; and more!

The Fred Kavli Distinguished Lectureship in Materials Science

John A. Rogers will present The Plenary Session Featuring The Fred Kavli Distinguished Lectureship in Materials Science on Tuesday, April 14, 8:15–9:30am, in PPC North, Ballroom 120 D. Rogers is the Louis Simpson and Kimberly Querrey Professor of Materials Science and Engineering, Biomedical Engineering, Mechanical Engineering, Electrical Engineering and Computer Science, Chemistry, and Neurological Surgery at Northwestern University. He is also the founding director of the endowed Center for Bio-Integrated Electronics.

Rogers's presentation is titled, "Functional Materials for Bioelectronic Neural Interfaces." Advanced electronic/optoelectronic devices built with classes of materials that enable intimate integration with soft tissues of the brain and the peripheral nervous system will accelerate

progress in neuroscience research; they will also serve as the foundations for new approaches to regenerative medicine and to the treatment of neurodegenerative diseases. Capabilities for injecting miniaturized electronic elements, light sources, photodetectors, thermal actuators, multiplexed sensors, programmable microfluidic networks and other components into precise locations of the deep brain, or softly laminating them onto the surfaces of nerves, will open up unique and important opportunities in stimulating, inhibiting, and monitoring behaviors of complex neural circuits. This presentation will describe concepts in materials science and assembly processes that underpin these types of technologies in one-, two-, and three-dimensional architectures. Examples include "cellular-scale" optofluidic neural probes for optogenetics research, 3D mesoscale networks for study of neural activity in developing organoids, and integrated systems for closed-loop control of bladder function by neuromodulation.

Rogers obtained his BA and BS degrees in chemistry and physics from

2020 MRS® SPRING MEETING & EXHIBIT

MEETING CHAIRS

Qing Cao
University of Illinois at
Urbana-Champaign

Miyoung Kim
Seoul National
University

Rajesh Naik
Air Force Research
Laboratory

James M. Rondinelli
Northwestern
University

Hong Wang
Southern University of
Science and Technology



The University of Texas at Austin. He received SM degrees in physics and chemistry, and his PhD degree in physical chemistry from the Massachusetts Institute of Technology (MIT). Rogers's research includes fundamental and applied aspects of nano- and molecular-scale fabrication, as well as materials and patterning techniques for unusual electronic and photonic devices, with an emphasis on bio-integrated and bio-inspired systems.

The Rogers Research Group at Northwestern University works to understand and exploit interesting characteristics of soft materials, such as polymers, liquid crystals, and biological tissues, and hybrid combinations of them with unusual classes of inorganic micro-/nanomaterials—ribbons, wires, membranes, or tubes. Their current research focuses on soft materials for conformal electronics, nanophotonic structures, microfluidic devices, and microelectromechanical systems.

Rogers's awards include the Benjamin Franklin Medal from The Franklin Institute (2019), the MRS Medal (2018), the Samuel R. Natelson Award from the American Association for Clinical Chemistry (2018), the Nadai Medal from The American Society of Mechanical Engineers (2017), the IEEE Engineering in Medicine and Biology Society Trailblazer Award (2016), and the ETH Zürich Chemical Engineering Medal (2015). He has published more than 650 papers, and is an inventor on more than 100 patents and patent applications, more than 70 of which are licensed or in active use by large companies and startups that he has co-founded.

Awards and Recognition Program

The **MRS Awards and Recognition Program—Featuring Lightning Talks and Panel Discussion with Award Recipients** will be held on Monday, 6:30–8:00 pm, at the Sheraton Hotel. Following the Awards and Recognition program, stay for interactive “lightning” talks by recipients of the following awards: Innovation in Materials Characterization Award; Mid-Career Researcher Award; E-MRS EU-40 Materials Prize; and the Outstanding Early-Career Investigator Award.

HOTELS IN PHOENIX

MRS receives meeting space at a greatly discounted rate as a result of contracting a large block of sleeping rooms at the official meeting hotels. In order to keep meeting costs as low as possible and minimize the financial risk to MRS, we encourage you to utilize the official MRS housing listed below.

To make reservations, visit mrs.org/spring2020/hotels.

- | | |
|---|--|
| <p>■ Sheraton Phoenix Downtown
340 North 3rd St., Phoenix, AZ 85004
602.262.2500
Group Rate: \$189 single/double*
Deadline: March 20, 2020</p> | <p>■ SpringHill Suites Phoenix Downtown
802 East Van Buren St., Phoenix, AZ 85006
602.307.9929
Group Rate: \$185 single/double*
Deadline: March 8, 2020</p> |
| <p>■ Hyatt Regency Phoenix
122 North 2nd St., Phoenix, AZ 85004
602.252.1234
Group Rate: \$199 single/double*
Deadline: March 20, 2020</p> | <p>■ Hilton Garden Inn Phoenix Downtown
15 East Monroe St., Phoenix, AZ 85004
602.343.0006
Group Rate: \$211 single/double*
Deadline: March 8, 2020</p> |
| <p>■ Renaissance Phoenix Downtown Hotel
100 North 1st St., Phoenix, AZ 85004
602.333.0000
Group Rate: \$193 single/double*
Deadline: March 20, 2020</p> | <p><i>* plus applicable taxes and fees, including fees for additional persons</i>
<i>Above rates are available until the reservation deadline or the group block is sold out, whichever comes first.</i></p> |

mrs.org/spring2020/hotels

This is your opportunity to engage with MRS thought leaders as they discuss their award-winning research. Our “Powerful Panel” will address materials science hot topics and current trends, as well as the impact these new technologies will have on society.

Meeting Events

Symposium X—Frontiers of Materials Research will feature presentations aimed at a broad audience and on topics at the forefront of research on materials science and engineering. Featured this year are Reshma Shetty, Ginkgo Bioworks, Inc. (“Designing Biology” on Tuesday); Christine Ortiz, MIT (“Socially Directed Science and Technology Education, Research and Innovation—Opportunities and Challenges for the Field of Materials Science and Engineering” on Wednesday); and Vijay Narayanan, IBM T.J. Watson Research Center (“The Golden Age of Materials Innovations—From High-κ/Metal Gate to AI Hardware” on Thursday). All three talks will be in Ballroom 120 D, PCC North, 100 Level, 12:15–1:15 pm.

The MRS Public Outreach Committee is presenting several professional

development and education outreach programs. (Check individual events for seating limits and preregistration requirements.)

Designing Sustainability into Materials Research Workshop. Many sustainability initiatives are focused on the development of technologies that minimize carbon footprint and energy use. In this interactive workshop on Monday, April 13, 2:00–5:00 pm, attendees will learn to expand the definition of sustainability to include aspects that limit sustainable materials development. The workshop will entail various modes of learning including presentations, videos, team discussions, and direct data access to information sources that can facilitate sustainable materials development in research activities. This workshop is appropriate for materials researchers at all career stages, including faculty and industry researchers, students, and early-career professionals. Preregistration is required. Limited seating is available for this free session.

Real-Life Challenges and Opportunities in Sustainable Product Design Seminar. Learn how to incorporate sustainability principles into your research in a more comprehensive way while



considering the real-world application of these principles to product design and manufacturing. Many sustainability efforts focus on improving resource efficiency by creating materials and devices that are less energy-, water-, and material-intensive, but to be commercially viable and have a global impact, researchers need to balance adverse short-term impacts with potential long-term gains. This seminar will be held on Monday, April 13, 8:00–9:00 pm and Tuesday, April 14, 7:30–8:30 pm, and is aimed at materials researchers of all career stages, from students and postdoctorate researchers to faculty and industry researchers.

The **How to Prepare for Your ABET Accreditation Session** will help materials departments prepare for their ABET visit. The training is on Tuesday, April 14, 7:15–9:30 pm, and the session can be attended without registering for the Meeting. Remote access will be available if unable to attend in person: mrs.org/spring2020-abet-training.

The Early Career Professionals Subcommittee will host a new poster session for members seeking careers in

industry and government laboratories on Wednesday, April 15, titled **Meet Your New Industry and Government Candidates—Poster Session**. This event offers an opportunity for recruiters and talent scouts from industry and government laboratories to meet new candidates. If you are interested in an industry or a government laboratory position but need a more effective platform to work with recruiters, or if you are a recruiter looking for talented candidates, this session is for you. The Early Career Professionals Subcommittee will also host a professional development session titled **How to Land a Faculty Position: From Application to Interview** on Monday, April 13, 1:30–4:30 pm. This seminar is for students and early career professionals interested in learning more about the faculty application process in the United States and Europe.

The Student Engagement Subcommittee will host a **Bridging the Gap Between Academia and Industry—Interactive Panel Session** on Monday, April 13, 1:30–4:30 pm. The panel will include researchers, entrepreneurs, and industry specialists discussing their experiences

and strategies to develop and commercialize their research, as well as starting a successful company or organization.

Meeting attendees are invited to participate in the popular **MRS Frontiers Reception—Building Communities, featuring PowerPoint™ Karaoke** on Thursday, April 16, 5:30–8:00 pm, in PCC North, 100 Level, Ballroom 120 D. PowerPoint Karaoke starts at 5:30 pm with participants showcasing their research in an interactive and fun way. The **Frontiers Reception** immediately follows at 6:30 pm. Topics featured during this interactive reception include sustainability, emerging biomaterials, artificial intelligence, quantum materials and technologies, responsive and adaptive materials, and other emerging areas. Be a part of this exciting brainstorming mixer!

The popular **Women in Materials Science & Engineering Breakfast** will be held at the Sheraton on Wednesday, April 15, 7:00–8:30 am.

Green Cards for Scientific Researchers—How to Win Your EB-1/NIW Case! will take place on the Exhibit Hall Stage on Tuesday, April 14, 2:30–3:30 pm. This



The 2020 MRS Spring Meeting will feature 10 tutorials.

Tutorials cover a variety of topics to complement the symposium sessions and are free of charge for all registered attendees. Tutorial notes will be available for purchase at the preregistration price of \$35. After the preregistration period ends, notes will be available for purchase for \$45 on-site at the MRS Publications Booth 100 in the Exhibit Hall.

All tutorials will be held on Monday, April 13, at the Phoenix Convention Center.

EL02

Mixed Dimensional Heterostructures from Fundamentals to Device Applications
8:30 am–3:00 pm • Room 124 B

EL05

Nanoimprint Lithography—Fundamentals and Recent Developments
8:30 am–12:00 pm • Room 125 B

EL07

New Approaches for Computing from Brain-Inspired Dynamics
8:30 am–12:00 pm • Room 126 B

EL09

Phase-Change Memory—Materials Fundamentals and Advanced Applications
8:30 am–5:00 pm • Room 126 C

EL12

Imaging and Modeling Ferroic Nanomaterials
1:30 pm–5:00 pm • Room 121 C

EN10

Research Methods and Best Practices for Emerging Inorganic Solar-Energy Conversion Materials
8:30 am–5:00 pm • Room 106 AB

NM01

Fluorescent Nanodiamonds—Fundamental Properties and Emerging Applications
8:30 am–12:00 pm • Room 128 B

NM07

Electronic, Optical and Magnetic Properties of Quantum Materials
1:30 pm–5:00 pm • Room 129 A

SM01

Microfluids and Microfluidic Devices
1:30 pm–5:00 pm • Room 221 A

SM03

Introduction to Flexible, Stretchable Biointegrated Electric Devices and Related Mechanics
8:30 am–5:00 pm • Room 221 C

TUTORIALS

mrs.org/spring2020/tutorial-sessions

will cover and compare the criteria for EB-1A classification for foreign nationals of extraordinary ability in the sciences, arts, education, business, or athletics; EB-1B classification for foreign nationals who are outstanding researchers and professors; and the National Interest Waiver (NIW) Category. For more information, visit click4immigration.com.

The **Materials for Next-Generation Nanoelectronics Workshop** will take place on Thursday, April 16, 8:30 am–12:00 pm. It will cover various topics of materials for nano-electronics across the entire value and innovation chain, from fundamental research up to industrial applications. The workshop goals are to provide select examples of technology transfer and first industrial deployment and to illustrate the particular role of research and technology organizations.

The **MRS Publications Booth 100** will be featured in the Exhibit Hall. Stop by to learn about the MRS Publications Portfolio on Tuesday, 2:00–7:00 pm and Wednesday, 11:00 am–7:00 pm.

Essentials of Getting Your Work Published will be held in PCC North on Monday, 3:30–5:00 pm. Learn about the fundamentals of successful scientific publishing from MRS journal editors-in-chief.

The **MRS Communications Lecture** will be in PCC North on Monday, 5:15–6:15 pm.

Poster Sessions will be held in PCC North, 300 Level, Foyer, on Tuesday, 9:00 am–7:00 pm and Wednesday, 7:00 am–7:00 pm. The Meeting chairs will recognize the best presentations each day of the Poster Sessions. One or more awards of up to \$500 will be presented based on the posters' technical content, appearance, graphic excellence, and presentation quality.

As part of the **MRS/Sociedad Mexicana de Materiales Student Poster Award Exchange Program**, Best Poster awardees from the XXVIII International

2020 MRS SPRING MEETING REGISTRATION RATES		
	PREREGISTRATION before 11:59 pm (ET) March 27, 2020	ON-SITE REGISTRATION after 11:59 pm (ET) March 27, 2020
Meeting Registration	\$735	\$875
Meeting Registration with MRS Member Discount	\$600	\$740
Student Registration*	\$170	\$205
Student Registration with MRS Member Discount*	\$135	\$170
Retired	\$200	\$225
Unemployed	\$170	\$210

2020 MRS Spring Meeting registrations include MRS Membership from July 1, 2020 to June 30, 2021.

*MRS reserves the right to request proof of full-time student status.

Materials Research Congress (IMRC) 2019 will present their posters at the 2020 MRS Spring Meeting. Posters will be displayed in the Exhibit Hall, PCC North, on Tuesday, 5:00–7:00 pm.

The popular **Science as Art competition** is open to all registered Meeting attendees. Multiple first- and second-place awards of \$400 and \$200, respectively, will be presented. Guidelines are listed on the 2020 MRS Spring Meeting website.

MRS will host a **Career Fair** in the Exhibit Hall, PCC North, on Tuesday, 2:00–7:00 pm and Wednesday, 11:00 am–7:00 pm to connect job seekers with recruiters and showcase available career opportunities. Attendees can discuss their qualifications directly with recruiters, participate in mock interviews, have their resume critiqued, and network with employers. Register online and upload your resume at jobs.mrs.org or stop by the Career Fair to access the registration stations.

Materials Voice will be available on-site in the Exhibit Hall on Tuesday and Wednesday for members to help support sustained federal research funding. It is quick and easy to send letters on current funding concerns and policy issues that are important to the materials research community. There will also be a **Research Funding Opportunities Session** on Monday,

5:30–8:00 pm. This session provides interaction between government funding agency presenters and MRS Membership. Invited talks will be followed by a roundtable question and answer session with individual program managers.

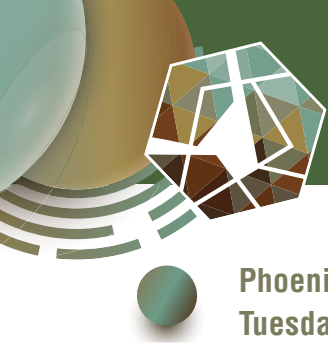
A **Congressional Science and Engineering Fellowship Program Information Session** will be available for attendees to learn about the MRS/OSA and MRS/TMS Congressional Fellowships on Tuesday, 4:15–5:15 pm. Former Fellows will share their experiences as scientists in the US Senate and House of Representatives.

Meeting Information

Details of various events and activities will be available via the MRS Meeting App and in the Meeting & Exhibit Guide available on-site. The MRS website can also be accessed for updated information on confirmed talks and details on special events, information on obtaining a visa, and preregistration at mrs.org/spring2020.

The deadline to preregister for the 2020 MRS Spring Meeting is March 27 (11:59 pm ET). International travelers are reminded to begin the visa process early. For additional information on the Spring Meeting, contact MRS Member Services via e-mail info@mrs.org or tel. 724-779-3003. □





Phoenix Convention Center, North Building, 300 Level, Exhibition Halls C–E
 Tuesday, April 14, 2:00 pm – 7:00 pm • Wednesday, April 15, 11:00 am – 7:00 pm

AAAS Science & Technology Policy Fellowships Booth 228
 stpf-aaas.org
 Fellowships; Professional Development

Admiral Instruments Booth 502
 admiralinstruments.com
 Potentiostats and Galvanostats; Electrochemical Impedance Spectroscopy; Battery Testing; Photo-electrochemistry

AdValue Technology, LLC Booth 405
 advaluetech.com
 High Quality Materials for Advanced Material Research and Production

AIP Publishing Booth 206
 publishing.aip.org
APL Materials; Applied Physics Letters; Applied Physics Reviews; APL Photonics; APL Bioengineering

AJA International, Inc. Booth 301
 ajaint.com
 Sputtering/E-Beam/Ion Milling Systems; Sputtering Sources; Target and Evaporation Material

American Physical Society Booth 224
 journals.aps.org
 Journals/Publishing

ANCORP Booth 200
 ancorp.com
 High and Ultra-high Vacuum Components

Angstrom Science, Inc. Booth 425
 angstromscience.com
 Atomic Force Microscopes; Scanned Probe Microscopes; Light Microscopes

Anton Paar Booth 207
 anton-paar.com
 Litesizer 500; PSA 1190; SAXSpoint; MCR 302; Step XX0 MCT; TRB3

Arizona State University Booth 227
 materials.asu.com
 Education; Research; Community Engagement

BioLogic Booth 404
 biologic.net
 Exclusive Provider of EC-Lab Instruments™

Blue Wave Semiconductors Booth 607
 bluewavesemi.com
 Pulsed Laser Deposition (PLD); Thin Film Deposition Systems

Bruker Booth 426
 bruker.com
 AFM Probes; AFM Systems; Nanomechanics, Nanoelectrics, Nanochemical and Nanoindentation Systems

Cambridge University Press Booth 105
 cambridge.org/academic
 Books and Journals

Cell Press Booth 204
 cell.com
 Scientific Journals

CrystalMaker Software Ltd. Booth 422
 crystalmaker.com
 CrystalMaker X; SingleCrystal 4; CrystalDiffract 6

Delcom Instruments Inc. Booth 303
 delcominst.com
 Noncontact Sheet Resistance Meters

Ecopia Corp. Booth 202
 four-point-probes.com/ecopia-hms-3000-hall-measurement-system
 Hall Effect Measurement Systems; HMS-3000 and HMS-5000 Series Systems for Measuring Resistivity

Electron Microscopy Sciences Booth 401
 emsdiasum.com
 Carbon and Sputter Coaters; Polishing Supplies; Precision Polishers; Cold and Hot Mounting Mediums

EnvisionTEC Inc. Booth 205
 envisiontec.com
 Professional-grade 3D Printers

Gatan Booth 307
 gatan.com
 TEM Specimen Preparation; TEM Specimen Holders; TEM Imaging and Spectroscopy; TEM Analysis

Goodfellow Ltd. Booth 423
 goodfellow.com
 Metals; Ceramics; Polymers; Nanomaterials

Hummingbird Scientific Booth 402
 hummingbirdscientific.com
 TEM; SEM; X-ray Synchrotron Specimen Holders

ibss Group, Inc. Booth 302
 ibssgroup.com
 Plasma Cleaner

Ionoptika Ltd. Booth 525
 ionoptika.com
 ToF SIMS; Single Ion Implantation; Gas Cluster Ion Beams

Janis Research Company, LLC Booth 306
 janis.com
 Cryogenics; Probe Stations; Cryostats

JASCO Booth 505
 jascoinc.com
 JASCO Spectra Manager Software; Spectroscopy and Chromatography Instrumentation

KP Technology Ltd. Booth 203
 kelvinprobe.com
 Ambient-pressure Photoemission Spectroscopy; Surface Photovoltage Spectroscopy; Kelvin Probe Systems

Kurt J. Lesker Company Booth 400
 lesker.com
 Pure Targets and Materials; Vacuum Components; Thin Film Deposition Systems

Lake Shore Cryotronics Booth 406
 lakeshore.com
 Cryogenic Probe Stations; Hall Effect Measurement Solutions; Vibrating Sample Magnetometers



M. Braun Inc. Booth 522

mbraun.com
Inert Gas Purification Systems;
Standard and Custom Enclosures;
Thin Film Coating Equipment

McCrone Group Booth 427

mccrone.com
JEOL Benchtop SEM; Linkam Thermal
Stages; Microscopes; Analytical Services

MilliporeSigma Booth 322

sigmaaldrich.com
Nanomaterials; Energy and Electronics;
Biomaterials

MKS Instruments, Inc. Booth 523

newport.com
Class AAA Solar Simulators

MTI Corporation Booth 507

mtixtl.com
Powder PVD Coating System; Vacuum
Melt Spinning System; High Throughput
Coin Cell Assembling System

Nanoscale Science Booth 226
User Centers

nsrcportal.sandia.gov
User Facility; Nanoscience Research;
Nanoscience Tools and Capabilities

National Academies of Booth 222
Sciences, Engineering, and Medicine

nas.edu/fellowships
Fellowships; Research Awards;
Graduate Funding

National Security Agency– Booth 327
Research Directorate

lps.umd.edu
Research; Physics; High-performance
Computing

neaspec GmbH Booth 305

neaspec.com
neaSNOM; nano-FTIR

Nextron Booth 600

nextron.co.kr
Micro Vacuum Probe Station

Nor-Cal Products Booth 300

n-c.com
High and Ultra-high Vacuum Components

NT-MDT America, Inc. Booth 223

ntmdt-si.com
Spectrum Instruments

Park Systems Booth 529

parksystems.com
Atomic Force Microscopy (AFM) Systems

PerkinElmer, Inc. Booth 528

perkinelmer.com
Analytical Instruments

Picoquant Photonics Booth 504
North America

picoquant-usa.com
Laser Sources; Photon Counting Electronics

Plasmaterials, Inc. Booth 601

plasmaterials.com
Sputtering Targets; Backing Plates; Precious
Metal Reclamation Program; Sputtering
Target Bonding; Evaporation Materials

Protochips Booth 524

protochips.com
Axon; Fusion Select; Poseidon Select;
Atmosphere

Quantum Design Booth 429

qdusa.com
Automated Material Characterization
Systems

R.D. Mathis Company Booth 604

rdmathis.com
Evaporation Sources; Evaporation
Materials; E-Beam Liners

Rigaku Booth 323

rigaku.com
MiniFlex 6G; SmartLab; SmartLab SE;
AutoMATE II; HyPix-3000

SAES Group Booth 503

saes-group.com
HV and UHV NeXTorr Pumps; CapaciTorr
Pumps; Wafer Modules

Scienta Omicron Booth 325

scientaomicron.com
Electron Spectroscopy; Scanning Probe
Microscopy; Thin Film Deposition

SPI Supplies, Division of Booth 201
Structure Probe, Inc.

2spi.com
Sample Preparation in SEM, TEM,
Optical and AFM Disciplines

Springer Nature Booth 101

springernature.com
Books and Journals

Staub Instruments Inc. Booth 506

staubinstruments.com
RHEED; Auger; Surface Analysis

TA Instruments Booth 304

tainstruments.com
Technology for Thermal Analysis;
Rheology and Thermophysical Properties

Ted Pella, Inc. Booth 501

tedpella.com
Microscopy Supplies; Sample Preparation
Supplies; Vacuum Coaters

Vigor Tech USA Booth 329

vigor-glovebox.com
Gloveboxes; Inert Atmosphere Research
Equipment

Wafer World, Inc. Booth 424

waferworld.com
Silicon Wafers; Germanium Wafers;
GaAs Wafers; Clean Room Packaging

J.A. Woollam Booth 407

jawoollam.com
Spectroscopic Ellipsometers;
Thickness and Refractive Index

Xenocs Booth 500

xenocs.com
Small Angle X-ray Scattering
Instrumentation (SAXS)