Nanomanufacturing Materials and Processes Annual Review
Research Program Annual Review

Aug 3 – Aug 5, 2022

Tokyo Electron, Austin, TX

Kashyap Yellai, Science Director

Tameka Bell, Research Program Coordinator

https://www.src.org/calendar/e007656/
https://www.src.org/program/grc/nmp/

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Thank you!

On Behalf of the SRC,

Thank You!

Tokyo Electron America (TEA) for graciously hosting the event!!

To all the industry members for their sponsorship and mentorship

To all the Principal Investigators & their Students for their continued research effort

To **Tameka Bell (SRC), Trace Hurd (TEA), Shanna Bland (TEA), Christina Butler (TEA)** for their time and great support with arranging the event!!

To all of you for traveling and being in-person with us!

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Review Reminders

Everyone will be participating in-person

Presenters should remember to speak clearly and keep within the allotted time.

Timing: 30 min (25 min talk + 5 min Q/A)

Presentations and Q&A will be live. Please be mindful, so watch the time!!!

Informal Presentations

Please indicate if you want the audience to interrupt with questions. Q/A will occur at the end

Industry people: Evaluation form (electronic) to be collected

Submit Compelling Research Reasons (CRR) as appropriate.

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Reminder: Invoicing and Deliverables

Regular invoicing

Invoice on regular basis: monthly is preferred

Excess money (calendar year) is considered profit and taxable!

Spending must occur within contract period

Invoicing expected to be at or above 95% invoiced at end of each contract period

Final invoice within 60 days after project ends

Submit deliverables on time: even 1 day is too late!

System will flag delinquencies

Late deliverables will stop invoices being paid and can jeopardize future funding

Contact SRC if there are issues with getting deliverables on time

Pre-publication drafts must be deposited at SRC > 60 days before published

Best practice: deposit draft to SRC website when submitting to journal/conference (also thesis)

Update the draft on the SRC website with final paper after acceptance (select submit a new version)

Acknowledgement of SRC funding must be added to all publications

Resources that Help Academics Evaluate, Adopt, and Amplify Emerging Member Solutions

Member Resources

- SRC has collected information members provide for the academic community, including education, design, and prototyping
- SRC researchers and students are encouraged to take advantage of these resources in their research and education activities
- Link to the resources:
  https://www.src.org/program/grc/guide/researcher/guidelines/

Member Resources

SRC has collected information members provide for the academic community, including education, design, and prototyping. SRC researchers and students are encouraged to take advantage of these resources in their research and education activities

Intel
- Intel Open Data Center Diagnostic Project
- Intel Academic Compute Resource Environment (ACE)
- Intel Academic Program for oneAPI

Analog Devices
- Active Learning Program
- ADALM-SR1 Hardware
- ADALM-SR1 Switching Regulator Active Learning Module

ARM

ARM Academic Access
ARM Education
- ARM University Program Education Kits
- ARM Education Online Courses
- ARM Education Textbooks and Reference Books

Texas Instruments
Specific tutorial and curriculum for universities include:
- Texas Instruments University Program
- TI Robotics System Learning Kit
- TI Power Management Lab Kit
- TI Experimental Power Electronics Reference and Curriculum
- TI Precision Labs

IBM
- IBM tutorial and curriculum for universities
- IBM Skills Academy
- IBM + Coursera
- IBM PhD Fellowship Program
- IBM Quantum Computing - student opportunities
- IBM AI Hardware

NXP
- Rapid IoT Prototyping Kit

Siemens
- EDA Academic Products

Qualcomm
- University Relations Program

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4819 Emperor Blvd, Suite 300 Durham, NC 27703

Voice: (919) 941-9400 Fax: (919) 941-9450

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New "Failure to Success" Workshops

https://www.src.org/calendar/failure-to-success/

- New workshop series to highlight challenges faced by our researchers and how they overcame them or set a new direction
  - Not all research will be successful, but we should continuously learn
  - <u>Open to all SRC</u>: industry, other academia, and SRC Research Scholars

- Most recent Failure to Success (5/18): "Lemons are for Lemonade?" by Professor Subu Iyer, UCLA (https://www.src.org/calendar/e007658/), over 160 people attended.

  I like very much the concept you have laid out, and I think I have a very nice example to share with the SRC community.

- More workshops are coming. Please stay tunned!
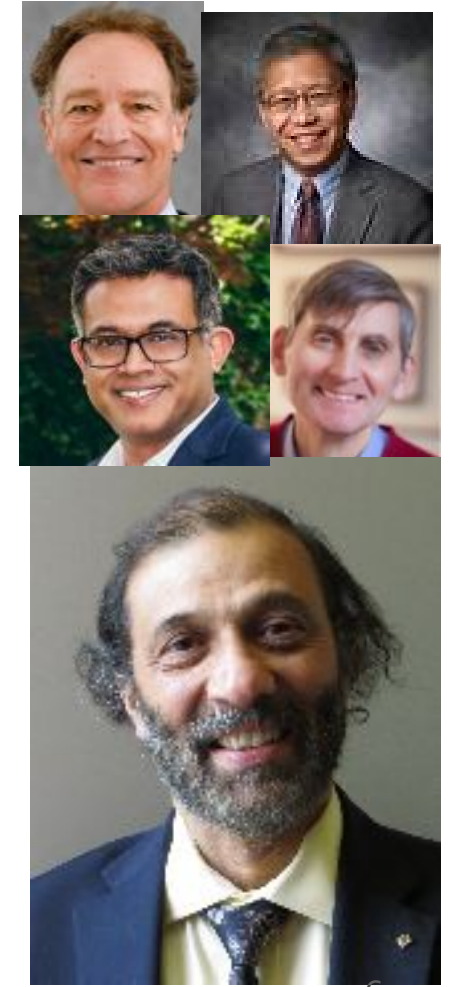
Reminder: Send News Items to SRC

- Send noteworthy events and announcements that you and your team are involved in to SRC

- Send this information on a monthly basis. We use what we can in our SRC newsletter and monthly emails to the Advisory Board and liaisons
  - Best Paper Awards (who, award, title of piece, where, when and photos of students/faculty)
  - Papers, posters presentations, and/or conference talks
  - Professional Recognition Awards: IEEE, teaching awards, etc.
  - Professional activities such as workshops, tutorials, and invited talks

- All submissions must have a web link (URL) to the award, paper, etc.
  - If you have your own website that contains information pertaining to your research, share the link with SRC as well

More Than 17,000 subscribers!!

New SRC Student Platform on LinkedIn (Beta)

Join the Beta Now!

- SRC Student Programs is rebranding to **"SRC Research Scholars" Program**

- What is the **SRC Research Scholars Program**?
  - SRC provides <u>undergrads, graduate students, and postdoctoral researchers</u> with a unique education consisting of traditional course work, cutting-edge research, and direct interaction with the semiconductor industry
  - These Research Scholars work on industry-relevant research with SRC-funded faculty who are recognized experts in their fields
  - Through our extensive community of academics and industry personnel, we nurture the evaluation of the talent pipeline for our industry and beyond
  - Our alumni have become industry leaders and renowned faculty researchers, creating a virtuous cycle where mojo begets mojo

SRC encourages all undergrads, graduate students, and postdoctoral researchers to join this Beta program!!!

Get LinkedIn with SRC

SRC uses a special LinkedIn Affiliate page for the SRC Research Scholars Program. Undergrad, graduate students, and postdoctoral researchers participating on SRC research add their SRC Research Scholars experience to their LinkedIn profile. This allows Scholars a way to professionally showcase their talent and experience. It also simplifies how recruiters, engineers, and even other Scholars can find SRC Research Scholars, using either the LinkedIn Search* or LinkedIn Recruiter*.

SRC Research Scholars Program*

By being part of our community, Research Scholars will have a unique opportunity to get to know professionals with careers in the semiconductor industry or government, top researchers in their fields, and other students with similar interests.

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Reminder: Student Hiring/Internship information back to SRC

- Relevantly trained students are one of the most valuable outcomes of the funded research
  - Hiring information is an important data point to highlight the value of SRC funded research to our member companies
- Include any SRC students (whether directly funded or participated in some way on the research) that graduated, were hired, or had an internship
  - **If you have a student that is working on the project but funded through other sources have them create a student account with SRC**; this allows SRC to promote them to our industry members
  - And let SRC know how they are being funded; as leveraged funding is a benefit for the members.
- Many students graduate and start the next chapter of their life but leave without updating their student record on the SRC website
  - As your students do internships or accept hiring offers, **PIs are expected to have their students update their accounts at SRC**

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Intellectual Property Statement

https://www.src.org/about/contracts-ip/#ip

The information provided by researchers during this annual review
- o Is the property of the university and of the researchers presenting this information
- o May include research results sponsored by and provided to the funding members
- o May include intellectual property rights belonging to the university and SRC, to which sponsors may have license rights

By attending or viewing this review, you are agreeing
- o Not to use this information for purposes unrelated to the review unless and until approved by SRC
- o To keep this information in confidence until the university and SRC have evaluated and secured any applicable intellectual property rights

After any intellectual property rights have been secured, the SRC encourages the University and researchers to publish and freely disseminate this information and results of the sponsored research program.
- o Worldwide patent rights are waived if publication or public dissemination occurs prior to filing a corresponding U.S. provisional or utility patent application

General Data Protection Regulation

- Applies to SRC
- Personal data regulations
- Involves privacy notices, consent, and security
- SRC Privacy Policy

Agenda for Annual Review, August 3rd
https://www.src.org/calendar/e007656/ (3- days in person at TEL, Austin)

Wednesday, August 3		
8:00 - 8:30 am	Registration / Poster Setup	
8:30 - 8:45 am	TEL Introduction	Trace Hurd / TEL
8:45 - 9:00 am	Introduction	Kashyap Yellai / SRC
9:00 - 9:30 am	**3035.001**: Novel Organic-Inorganic Hybrid EUV Dry Resists Deposited by Molecular Atomic Layer Deposition (MALD)	Jiyoung Kim & Chang-Yong Nam / UT/Dallas
9:30 - 10:00 am	**3028.001**: Low Temperature Chemical Vapor Deposition of SiNx in Deep Features	John R. Abelson & Gregory S. Girolami / UIUC
10:00 - 10:30 am	**3030.001**: Controlling EUV Resist Stochastics through Resist Processing	Gregory Denbeaux / SUNY POLY
10:30 - 10:45 am	Break	
10:45 - 11:15 am	**3027.001**: Process-dependent Native Oxide Metrology using Spectroscopic Ellipsometry & **3027.002**: Atomic-scale Imaging and Spectroscopy	Rafael Jaramillo, Frances Ross / MIT & Wouter Mortelmans / KU Leuven
11:15 - 11:45 am	**3026.001**: Machine Learning-based Efficient Atomic Layer Deposition	Parag Banerjee & Sudipta Seal / Central Florida
11:45 - 12:15 pm	**3033.001**: EUV Resist Development through Rapid Screening of Hybrid Molecular Layer Deposition Films	David S. Bergsman / Univ. of Washington
12:15 - 1:45 pm	Lunch / Poster Session	
1:45 - 2:15 pm	**3047.001**: Metal Thermal Conductivity Scaling in Nanoscale Devices and Interconnects	Patrick E. Hopkins / Univ. of Virginia
2:15 - 2:45 pm	**3032.001**: Nano-projectile SIMS for Evaluating Molecular Homogeneity in Ultra-small Domains	Michael Eller / CalState, Northridge
2:45 - 3:15 pm	**3031.001**: New Oxidants for Copper Atomic Layer Etching	Adam S. Hock / Illinois IT
3:15 - 3:30 pm	Break	
3:30 - 4:00 pm	**3029.001**: Exploring Wet Etching Reactions in Nanoconfinements	Chuanhua Duan / Boston Univ.
4:00 - 4:30 pm	**3025.001:** Area Selective ALD using Next-generation Surfactants	Cathleen Crudden / Queen's Univ.
4:30 - 4:45 pm	Break	
4:45 - 5:45 pm	TAB Caucus	
5:45 pm	End of Day 1	
6:30 pm	Dinner	

Agenda for Annual Review, August 4th
https://www.src.org/calendar/e007656/ (3- days in person at TEL, Austin)

Thursday, August 4		
8:00 - 8:30 am	Registration / Poster Setup	
8:30 - 8:45 am	Introduction	Kashyap Yellai / SRC
8:45 - 9:15 am	**3048.001**: Photoresist Design through Structure Modeling	Fernando Escobedo / Cornell
9:15 - 9:45 am	**3034.001**: Topographically Selective ALD Relying on Vapor-phase Dosing of Inhibitor Molecules and Plasma Ion Exposure	Adriaan J. Mackus / Eindhoven Univ. of Tech.
9:45 - 10:15 am	**3049.001**: High-Throughput Area-Selective Spatial ALD with Interleaved Etching Steps for Low Defectivity	Alfredo Mameli / Holst Center
10:15 - 10:30 am	Break	
10:30 - 12:00 pm	**2974.001**: Orthogonal DoD/MoM Area Selective Deposition for Advanced Nanopatterning	Gregory Parsons & Hwan Oh / NC State
	3036.001: Low Temperature Thermodynamically-Favored Area Selective Deposition	Gregory Parsons & Hannah Margavio / NC State
	3088.001: Precise Lateral Area-Selective Deposition	Gregory Parsons & Nicholas Carroll / NC State
12:00 - 1:00 pm	Lunch / Poster Session	
1:00 - 1:30 pm	Industry Talk	Daniel Schmidt / IBM
1:30 - 2:00 pm	**3092.001** & **3093.001**: Low-resistivity Metal-semiconductor Contacts through Insertion of Layered Electrides	Jesse Maassen & Pukun Tan / Purdue & Peide Ye & Mohammad Rafiee Diznab / Dalhousie Univ.
2:00 - 2:30 pm	**3086.001** & **3087.001**: Next Generation Area Selective Deposition using Reactive SAMs and Photochemical CVD	Amy Walker & Lisa McElwee-White / UT/Dallas
2:30 - 3:00 pm	**2889.001**: Exploiting Competitive Interactions for Area-Selective Thermal and Plasma-Enhanced Thin Film Deposition	James Engstrom & Robert DiStasio / Cornell
3:00 - 3:15 pm	Break	
3:15 - 3:45 pm	**2903.001**: Agile Manufacturing Systems	Diego Klabjan / Northwestern
3:45 - 4:15 pm	**3091.001**: ALD Precursor Development for Low Resistivity Zr, Hf, and Nb Nitride Films	Charles H. Winter / Wayne State
4:15 - 4:45 pm	**3094.001**: Quasi-2D Materials for Ultra-low Resistance Interconnects	Hari P. Nair / Cornell
4:45 - 5:00 pm	Break	
5:00 - 6:00 pm	TAB Caucus	
6:00 pm	End of Day 2	
6:30 pm	Dinner	

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Friday, August 5		
8:00 - 8:30 am	Registration / Poster Setup	
8:30 - 8:45 am	Introduction	Kashyap Yellai / SRC
8:45 - 9:15 am	3083.001: Gas Phase Methods for Selective Thermal Atomic Layer Etching of Si-Based Materials	Steven George / Univ. Colorado/Boulder
9:15 - 9:45 am	3084.001: Area Selective Deposition on Ultrathin EUV Resists- Towards Enabling High NA EUV Resists	Christophe Vallee / SUNY POLY
9:45 - 10:15 am	3095.001: New Room Temperature Multiferroics Based on Hyperferroelectricity for Scalable, Efficient Logic and Memory	John T. Heron & Matt Webb / Univ. of Michigan
10:15 - 10:30 am	Break	
10:30 - 11:30 am	3085.001: High-conductivity Vertical Interconnects with Low Contact Resistance 3115.001: Alternative FCC Metals for High-conductivity Narrow Interconnects	Daniel Gall / RPI
11:30 - 12:00 pm	3082.001: Carbon-free Sol-gel Precursors for Metal Oxide EUV Resist	Julia W. Hsu / UT/Dallas
12:00 - 1:30 pm	Lunch / Poster Session	
1:30 - 2:00 pm	3113.001: Development of Heterobimetallic Molecular Precursors for Atomic Layer Deposition	Connie Lu / Univ. of Bonn
2:00 - 2:30 pm	3114.001: Amorphous Metal Organic Frameworks as a Dry EUVL Resist Technology	Howard Fairbrother & Michael Tsapatsis / Johns Hopkins
2:30 - 2:45 pm	Break	
2:45 - 3:30 pm	TAB Caucus	
3:30 pm	End of Day 3	

Thank You!

Kashyap Yellai

Kashyap.Yellai@src.org

July 21, 2022

SRC Liaison Program
Maximizing the Value of Participation
Move Yourself, Your Company and the Next Generation Forward

Develop the Workforce

- Provide relevant guidance for industry challenges
- Prepare students to enter industry or pursue future academics

Contribute to Research

- Encourage technology exchange between university and industry
- Bridge the conventional gap between academia and industry

Academia Contributes to Industry

- Provide an out of the box approach to current problems which enhance industry research and development enables a differentiated product for the marketplace
- Provide an outside perspective adding diversity to the thought process of how best to attack a challenge

Access New Technology

- Gain valuable insights into problems and solutions that will ultimately impact industry competitiveness
- Provide an effective way to deliver actionable research results directly into their companies

Identify the Best

- Identify the most compelling research from current and recent research

https://www.src.org/liaison/

> **Expectation to have regular PI-Liaisons calls at least one every 4-8 weeks**

Investigator — Student — Liaison

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Effective collaboration begins with communication

SRC Program Manager

- Runs Advisory Board and aligns research
- Educates PI about requirements and responsibilities
- Encourages Liaison participation
- Finds opportunities for further engagement

University PI

- Pursues ambitious, ground-breaking research
- Schedules regular calls, every 4-8 weeks
- Arranges meet-ups at conferences
- Presents research at annual reviews

Student

- Leads meetings
- Presents findings
- Aims to present at TECHCON
- Is knowledgeable about SRC members

Liaison

- Provides industry perspective to PI
- Transfers technology into company
- Advocates for SRC research
- Coordinates with Advisory Board

Academics solving meaningful problems

Increase of tech transfer

Clear investment ROI

SRC Scholars for Hire/Internship within 1 Year, p1

https://www.src.org/student-center/student-directory/?grc-thrust_areas=510

Last Name	First Name	Advisor	Task	Subthrust	Expected Grad. Date	Internship Avail. Date	Hire Avail. Date	Thesis / Interest	Task Title	Degree
DeJesus	Joseph	Cathleen Crudden (Queen's Univ.)	3025.001	Patterning	2022-01-05				Area Selective ALD using Next-generation Surfactants	PhD
Bosso	Jessica	Paul Ragogna (Western University)	3025.001	Patterning	2022-04-30				Area Selective ALD using Next-generation Surfactants	BS
Antonovich	Belle	Gregory Denbeaux (SUNY POLY)	3030.001	Patterning	2022-05-09			EUV Resist Stochastics	Controlling EUV Resist Stochastics through Resist Processing	PhD
Strausser	Shelby	Cathleen Crudden (Queen's Univ.)	3025.001	Patterning	2022-05-10				Area Selective ALD using Next-generation Surfactants	Post Doc

If your company is looking for great candidates, please consider SRC Scholars first!

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SRC Scholars for Hire/Internship within 1 Year, p2

https://www.src.org/student-center/student-directory/?grc-thrust_areas=510

Last Name	First Name	Advisor	Task	Subthrust	Expected Grad. Date	Internship Avail. Date	Hire Avail. Date	Thesis / Interest	Task Title	Degree
Subramanian	Ashwanth	Chang-Yong Nam (Stony Brook)	3035.001	Patterning	2022-05-27	2021-05-31	2022-05-30	Investigating the potential use of infiltration synthesized nanohybrids and nanostructures for applications in nanopatterning, chemical, and optical sensing, resistive random-access memory devices, thin-film transistors (Advisor: Dr. Chang-Yong Nam).	Novel Organic-Inorganic Hybrid EUV Dry Resists Deposited by Molecular Atomic Layer Deposition (MALD)	Post Doc
Jang	Jaeyeon	Diego Klabjan (Northwestern)	2903.001	Front End Processes	2022-05-31	2021-12-27	2022-06-01	Teacher-student-explorer network for open set recognition	Agile Manufacturing Systems	Post Doc
Kim	Jung Sik	Gregory Parsons (NC State)	2974.001	Patterning	2022-05-31		2022-06-01	Area Selective deposition of metals, dielectrics, and polymers by atomic layer deposition and chemical vapor deposition	Orthogonal DoD/MoM Area Selective Deposition for Advanced Nanopatterning	PhD
Feit	Corbin	Parag Banerjee (Central Florida)	3026.001	Front End Processes	2022-08-08		2022-09-01	My dissertation involves developing sensors for rapid biomarker testing. One of the principal processes for developing my sensor is selective-area atomic layer deposition to selectively coat nano-structures devices to enable biomarker detection.	Machine Learning-based Efficient Atomic Layer Deposition	PhD
Azhari	Nabihah	Gregory Denbeaux (SUNY POLY)	3030.001	Patterning	2022-08-15				Controlling EUV Resist Stochastics through Resist Processing	MS
Bangalore Prakash	Prajwal	Fernando Escobedo (Cornell)	3048.001	Patterning	2022-08-23				Photoresist Design through Structure Modeling	PhD
Juang	Tzung-Han	Diego Klabjan (Northwestern), Han Liu (Northwestern)	2903.001	Front End Processes	2022-08-31				Agile Manufacturing Systems	PhD
Brown	Jordan	Cathleen Crudden (Queen's Univ.)	3025.001	Patterning	2022-08-31				Area Selective ALD using Next-generation Surfactants	MS

If your company is looking for great candidates, please consider SRC Scholars first!

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SRC Scholars for Hire/Internship within 1 Year, p3

https://www.src.org/student-center/student-directory/?grc-thrust_areas=510

Last Name	First Name	Advisor	Task	Subthrust	Expected Grad. Date	Internship Avail. Date	Hire Avail. Date	Thesis / Interest	Task Title	Degree
Singh	Ishwar	Cathleen Crudden (Queen's Univ.)	3025.001	Patterning	2022-08-31	2022-08-01	2022-08-01		Area Selective ALD using Next-generation Surfactants	PhD
Veinot	Alex	Cathleen Crudden (Queen's Univ.)	3025.001	Patterning	2022-09-01				Area Selective ALD using Next-generation Surfactants	PhD
Tomko	John	Patrick E. Hopkins (Univ. of Virginia)	3047.001	Back End Processes	2022-09-01	2021-09-01	2021-09-01		Metal Thermal Conductivity Scaling in Nanoscale Devices and Interconnects	Post Doc
Souqui	Laurent	John R. Abelson (UIUC)	3028.001	Back End Processes	2022-10-05			Low temperature CVD for area-selective, conformal and/or ultra smooth deposition of materials	Low Temperature Chemical Vapor Deposition of SiNx in Deep Features	Post Doc
Gummadavelly	Aditya	Jiyoung Kim (UT/Dallas)	3035.001	Patterning	2022-12-05	2022-05-04	2022-05-05	Semiconductors, Lithography, electronic materials, Extreme Ultraviolet Lithography (EUVL), hybrid EUV capable photoresists.	Novel Organic-Inorganic Hybrid EUV Dry Resists Deposited by Molecular Atomic Layer Deposition (MALD)	PhD
Cruz	Jander	Michael Eller (CalState, Northridge)	3032.001	Patterning	2022-12-15	2021-01-04	2021-01-04		Nano-projectile SIMS for Evaluating Molecular Homogeneity in Ultra-small Domains	MS
Hoque	Md Shafkat Bin	Patrick E. Hopkins (Univ. of Virginia)	3047.001	Back End Processes	2022-12-30	2022-05-15			Metal Thermal Conductivity Scaling in Nanoscale Devices and Interconnects	PhD
Arunachalam	Ayush	Kanad Basu (UT/Dallas)	3026.001	Front End Processes	2022-12-31	2022-05-16			Machine Learning-based Efficient Atomic Layer Deposition	PhD
Hwang	Su Min	Jiyoung Kim (UT/Dallas)	3035.001	Patterning	2022-12-31				Novel Organic-Inorganic Hybrid EUV Dry Resists Deposited by Molecular Atomic Layer Deposition (MALD)	Post Doc
Xu	Weijie	Julia W. Hsu (UT/Dallas)	3082.001	Patterning	2023-01-01				Carbon-free Sol-gel Precursors for Metal Oxide EUV Resist	PhD

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SRC Scholars for Hire/Internship within 1 Year, p4

https://www.src.org/student-center/student-directory/?grc-thrust_areas=510

Last Name	First Name	Advisor	Task	Subthrust	Expected Grad. Date	Internship Avail. Date	Hire Avail. Date	Thesis / Interest	Task Title	Degree
Dianat	Golnaz	Gregory Parsons (NC State)	2974.001	Patterning	2023-01-16				Orthogonal DoD/MoM Area Selective Deposition for Advanced Nanopatterning	Post Doc
Mortelmans	Wouter	Rafael Jaramillo (MIT)	3027.001	Front End Processes	2023-02-15		2022-08-15	Epitaxy of ferroelectric/-elastic SnSe for integrated photonics applications	Process-dependent Native Oxide Metrology using Spectroscopic Ellipsometry	Post Doc
Le	Dan N.	Jiyoung Kim (UT/Dallas)	3035.001	Patterning	2023-05-18				Novel Organic-Inorganic Hybrid EUV Dry Resists Deposited by Molecular Atomic Layer Deposition (MALD)	PhD
Zhang	Minghua	Daniel Gall (RPI)	3085.001	Back End Processes	2023-05-20	2022-05-01			High-conductivity Vertical Interconnects with Low Contact Resistance	PhD
Grayson	Jessica	Julia W. Hsu (UT/Dallas)	3082.001	Patterning	2023-05-22				Carbon-free Sol-gel Precursors for Metal Oxide EUV Resist	MS
Lee	Joshua	John T. Heron (Univ. of Michigan)	3095.001	Front End Processes	2023-05-31	2022-06-01	2023-08-01		New Room Temperature Multiferroics Based on Hyperferroelectricity for Scalable, Efficient Logic and Memory	MS
Oh	Hwan	Gregory Parsons (NC State)	2974.001	Patterning	2024-05-20	2022-03-01			Orthogonal DoD/MoM Area Selective Deposition for Advanced Nanopatterning	PhD
Reece	Duncan	David S. Bergsman (Univ. of Washington)	3033.001	Patterning	2024-08-31	2022-07-01			EUV Resist Development through Rapid Screening of Hybrid Molecular Layer Deposition Films	PhD
Mathkari	Rajas	Gregory Denbeaux (SUNY POLY)	3030.001	Patterning	2025-02-01	2022-02-01	2025-02-01		Controlling EUV Resist Stochastics through Resist Processing	PhD
Lee	Won Il	Chang-Yong Nam (Stony Brook)	3035.001	Patterning	2025-02-01	2025-02-01	2025-02-01		Novel Organic-Inorganic Hybrid EUV Dry Resists Deposited by Molecular Atomic Layer Deposition (MALD)	PhD

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