National Nanotechnology Coordinated Infrastructure

nano@stanford

NNCI 2018 Etch Workshop-October 10-11 at Stanford University

Dear NNCI Etch colleagues,

After many months of careful planning, the co-organizers (Usha Raghuram-Stanford and Ling Xie-Harvard) and I are pleased to formally announce the details of the upcoming NNCI Etch Symposium. The event to be held at Stanford on October 10-11 is expected to be very informative, enlightening, and educational. The primary objective is to collectively assemble etch personnel from the NNCI sites so that we can create an interactive forum where we can share our knowledge of etch equipment and processes. An important outcome of the previous etch workshop held at Cornell in 2016, was the creation of a detailed database of NNCI etch systems and process capabilities. This listing is a tremendous asset for technical staff and user managers as we assess project proposals for feasibility and it allows us to seek supplemental resources within the network, if necessary. This listing is available on the NNCI website, https://www.nnci.net/technical-resources.

We have structured this 2-day event so that we can accommodate both NNCI members and the local bay-area academic and industrial research communities. There will be a vendor exhibit on both days where major etch equipment vendors such as Applied Materials, Lam Research, Plasmatherm, Oxford Instruments, SPTS, Samco, Memsstar, and others will offer information on their latest offerings in etch and etch related equipment. The event will be structured as follows:

Day 1: October 10-Open to NNCI members only.

We will have site updates on etch equipment capabilities, new processes, and any future plans for equipment acquisition or modification. Each NNCI site will be given 20 minutes to present their information. We are hoping for participation from the 16 NNCI sites and will offer a web conferencing option for those unable to attend in person. In addition to the site updates, we are soliciting presentations on specialized etch topics from NNCI technical staff. If you are interested in presenting any interesting research results, please contact any member of the organizing committee. There will be an open discussion at the end of the day to discuss any etch related issues, as well as a tour of the Stanford Nanofabrication Facility. The vendor equipment exhibit will be open throughout the day so that NNCI personnel can meet with vendor representatives. There will be a catered dinner on the Stanford campus for NNCI attendees and vendors.

Day 2: October 11-Open to the NNCI, SNF, and other researchers:

We will have invited technical talks from technical staff members of the vendors mentioned above as well as contributed talks from NNCI technical staff. These vendor talks will be technology based with process advancements in areas such as ALE (atomic layer etching), plasma dicing, III-V etching, deep oxide etching, vapor phase etching of sacrificial materials, semiconductor scaling and others. We will have NNCI technical staff presentations from Harvard, Stanford, and Cornell on topics such as

"Directional Diamond Etching", "Crystallographic Orientation Dependent RIE", "Plasma Damage", and "Pulsed ICP Etching of Silicon with HBr". The vendor exhibit will be open throughout the day for distribution of material and discussions with vendor representatives.

Due to the generous sponsorship of this symposium by the participating equipment vendors, we will be able to offer travel assistance up to $500 for 1 person from those NNCI sites who would like to attend. This will in most cases cover the airfare for those attendees. I will also be working with the NNCI coordinating office at Georgia Tech for some limited travel assistance.

2018 NNCI Etch Symposium Registration:

Please register for the event using the following link:

https://stanforduniversity.qualtrics.com/jfe/form/SV_5tGguIHSpwTUWR7

We look forward to maximum participation from our NNCI colleagues to make this symposium very informative and memorable, so please register as soon as possible. As a reminder, travel assistance up to $500 will be provided for one representative from participating NNCI sites. Please make your travel and hotel reservations soon to avoid any inconveniences.

If you have any questions regarding the event, please contact any member of the organizing committee. We look forward to seeing you at Stanford in October.

Day 1 Agenda: Location – Paul G. Allen Building; Room 101X

NNCI Site Updates

- 8-8:30am: Breakfast
- 8:30-8:40am: Welcome
- 8:40-9:00am: Stanford
- 9:00-9:20am: Harvard
- 9:20-9:40am: Cornell
- 9:40-10:00am: Penn
- 10:00-10:10am: Break/Vendor Exhibit
- 10:10-10:30: Washington
- 10:30-10:50am: Georgia Tech
- 10:50-11:10am: Minnesota
- 11:10-11:30am: Texas
- 11:30-11:50am: North Carolina
- 11:50-12:10pm: Nebraska
- 12:10-1:30pm: Lunch/ Vendor Exhibit
- 1:30-2:15pm: V.Genova-Cornell-"Pulsed ICP etching of Si with HBr"
- 2:15-2:35pm: ASU
- 2:35-2:55pm: Louisville
- 2:55-3:15pm: Chicago
- 3:15-3:30pm: Break/Vendor Exhibit
- 3:30-3:50pm: Montana St.
- 3:50-4:10pm: Virginia Tech.
- 4:10-5:00pm: Open discussion
- 5:00-6:00pm: SNF tour for NNCI members
- 6:00pm: Dinner

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Day 2 Agenda: Location – Paul G. Allen Building; Room 101X

Contributed Talks From Faculty Researchers, NNCI Researchers and Vendor Experts:

- 8:00-8:30am: Breakfast
- 8:30-8:40am: Director introduction
- 8:40-9:10am: Joydeep Guha-Applied Materials-"Semiconductor Scaling in the Era of Data Explosion"
- 9:10-9:40am: Haig Atikian-Harvard-"Directional Diamond Etching"
- 9:40-10:10am: David Lishan-Plasmatherm-"Plasma Dicing and F.A.S.T. CVD"
- 10:10-10:30am: Break/Vendor Exhibit
- 10:30-11:00: Keren Kanarik-Lam Research-"Atomic Layer Etching-Rethinking the Art of the Etch"
- 11:00-11:30: Ling Xie-Harvard-"Crystallographic Orientation Dependent RIE"
- 11:30-12:00: Peter Wood -Samco-"ICP Etching of Compound Semiconductor Devices"
- Noon-1:30pm: Lunch and Vendor Exhibits
- 1:30-2:00pm: Steve Vargo-SPTS- "Deep oxide etching"
- 2:00-2:30pm: Jim McVittie-Stanford-"Plasma Damage"
- 2:30-3:00pm: Demetrius Chrysostomou-Oxford Instruments-"Atomic Layer Etching"
- 3:00-3:30pm: Tony McKie-Memsstar-"Vapor Phase Etching of Sacrificial Materials-Maximizing Their Performance"
- 3:30-4:00pm: Break
- 4:00-4:30pm: wrap up, Q & A
- 4:30-5:30pm SNF &SNSF tours

Travel and accommodations:

The Stanford campus is equidistant from either the San Francisco or San Jose airport. There are several hotels in the Palo Alto area, some of which currently having vacancies on the conference dates are:

1. Comfort Inn, 3945 El Camino Real, Palo Alto. 650-493-3141, ext. 402 for reservations.
2. Dinah's Garden Hotel, 4261 El Camino Real, Palo Alto, 650-493-2844 for reservations.
3. Stanford Motor Inn, 3305 El Camino Real, Palo Alto, 650-493-3153 for reservations.

Many of the hotels are within walking distance of the campus and there are Cal-train stations nearby for a quick shuttle. There are also affordable options such as Airbnb.com. For parking information or any other travel related questions, contact Usha Raghuram.

Sponsorship:

We would like to acknowledge the sponsors of our symposium for their generous gift contributions towards the symposium and travel expenses. Below is the list of contributors to date.

Sponsoring Institution	Sponsorship level
Applied Materials	Gold

PlasmaTherm	Gold
Lam Research	Gold
Ulvac	Gold
SPTS	Silver
Oxford Instruments	Silver
Samco	Silver
Memsstar	Silver
Qualtx	Bronze
Nanosilicon	Bronze

Best regards,

NNCI Workshop organizing Committee

- Vince Genova, Cornell U., genova@cnf.cornell.edu
- Ling Xie, Harvard U., lxie@cns.fas.harvard.edu
- Usha Raghuram, Stanford U, usha@stanford.edu