Northwest Nanotechnology Infrastructure (NNI)

University of Washington / Oregon State University
PI: Karl F. Böhringer
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National Nanotechnology Coordinated Infrastructure

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NNCI NORTHWEST NANOTECHNOLOGY INFRASTRUCTURE

W OSU Oregon State University

NNI – Vision

The NNCI Northwest Nanotechnology Infrastructure acts as an engine for innovation and economic development by providing world-class nanotechnology infrastructure for a broad and diverse user base, paired with technical and educational leadership in photonic and quantum devices, advanced energy materials and devices, and bio-nano interfaces and systems.

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NNI 2.0 Team – Facilities and Principal Focus Areas


☆ Karl Böhringer


☆ Maria Huffman


Lara Gamble


John Conley

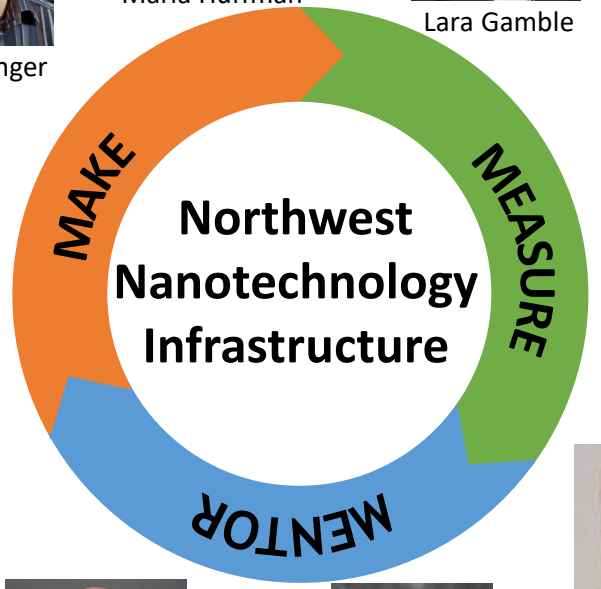

Greg Herman


Todd Miller


Daniel Ratner

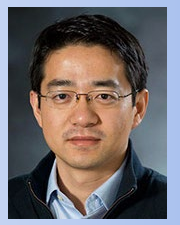

Joe Baio


☆ Liney Árnadóttir



Integrated Photonics / Quantum


Kai-Mei Fu


Mo Li


Oksana Ostroverkhova

Energy Materials & Devices


Chih-hung Chang


Zhenxing Feng

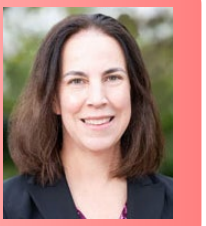

David Ginger


Daniel Schwartz

Bio-nano Interfaces


Joe Baio


Daniel Ratner


Lara Gamble

☆ present today

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What successful examples of programs, activities, and relationships in the current NNCI could be adapted or expanded for multiple sites in a future network?

Regional Networks

- Northwest Nano Lab Alliance (NWNLA)
  - Regional platform for exchange of laboratory experiences and best practices
  - Joint effort by NNI and MONT
  - Biennial meetings, alternating with UGIM (online 11/2021, in-person 8/2023, 2025)
  - Attendees from across the PNW including Canada
  - Develop more opportunities for staff career advancement, e.g., “nano sabbaticals”

- New alliances
  - NSF Northwest Engine for Advancing the Semiconductor Ecosystem led by OSU, with academic, government, and industry partners
  - Oregon Semiconductor Center of Innovation Excellence (CIE) led by OSU, Intel, Oregon Business Council

Collaboration with Industry

- More than 20% of US semiconductor jobs are in Pacific NW, even though ID, OR, WA have less than 14M (5%) of US population

- Aligning with national semiconductor technology centers:
  - New Advanced Lithography Center in Hillsboro, OR
  - New Memory Center of Excellence, $15B Micron memory fab in Boise, ID
  - Northwest University Semiconductor Network, led by Micron has grown to 13 universities and numerous community colleges in CA, ID, MT, OR, UT, WA

- Need integration of strategic public sector and academic institution involvement to maximize impact on workforce development, innovation, entrepreneurship

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Workforce Development

- Extensive Undergraduate Laboratory Assistant program
  - NNI employs ~20 undergrads/year, mentored by staff, increasingly complex tasks
- Short courses and workshops
  - Started with local students, focus on URMs
  - Expanded to professional students
  - Hands-on courses are expensive – but growing support from industry
- WFD at all levels
  - K-12 and tribal outreach & research experience for tribal teachers
    - Build sustained relationships with K-12 tribal partners
    - On-campus experiences for students and teachers
  - College transition programs for longitudinal engagement and tracking
    - Focus on retention in 4-year engineering degree programs
    - Target underserved populations with intrusive academic and advising support

- Need repository for content and best practices, sharing with other sites
- Deliver workforce development at scale – how to grow from 20 to 2000 per year?

Panel 4

How does NNCI support national research priorities, and how can this be enhanced in a future nanotechnology infrastructure?

Panel 4: NNI, CNS, NanoEarth, MiNIC

How does NNCI support national research priorities, and how can this be enhanced in a future nanotechnology infrastructure?

- NNCI facilities support research in virtually every 'national research priority' – bedrock of academic research in this space
  - "NNCI brand" – unique capabilities for foundational research and education
    - Complementary to regional engines, ME commons, which focus on economic development
  - Recent survey: NNCI facilities support >2,600 PIs, ~3,900 grants worth >$5B

- Build on NNCI's strengths
  - Address a wide variety of fields with broadly distributed impacts
  - Reach out to non-NNCI sites
  - Obtain support for permanent staff and workhorse tools – essential for broad accessibility
  - Define goals and milestones for 5-year / 10-year success

Panel 4: NNI, CNS, NanoEarth, MiNIC

How does NNCI support national research priorities, and how can this be enhanced in a future nanotechnology infrastructure?

- Lab-to-Fab: prototyping using new materials and processing techniques to address an expanding range of problems
  - Advancing processing technology to enable new products
  - Trade-offs: flexibility, cost
  - Protection of IP

- Workforce: engage a diverse group of students (at all levels) in high-tech projects
  - A diverse selection of schools, culturally and geographically, to extend the NNCI network

Panel 4

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