



**Minnesota Nano Center**

**NDSU Packaging Center**

UNIVERSITY OF MINNESOTA  
Driven to Discover™

**NDSU** NORTH DAKOTA  
STATE UNIVERSITY

# Midwest Nano Infrastructure Corridor

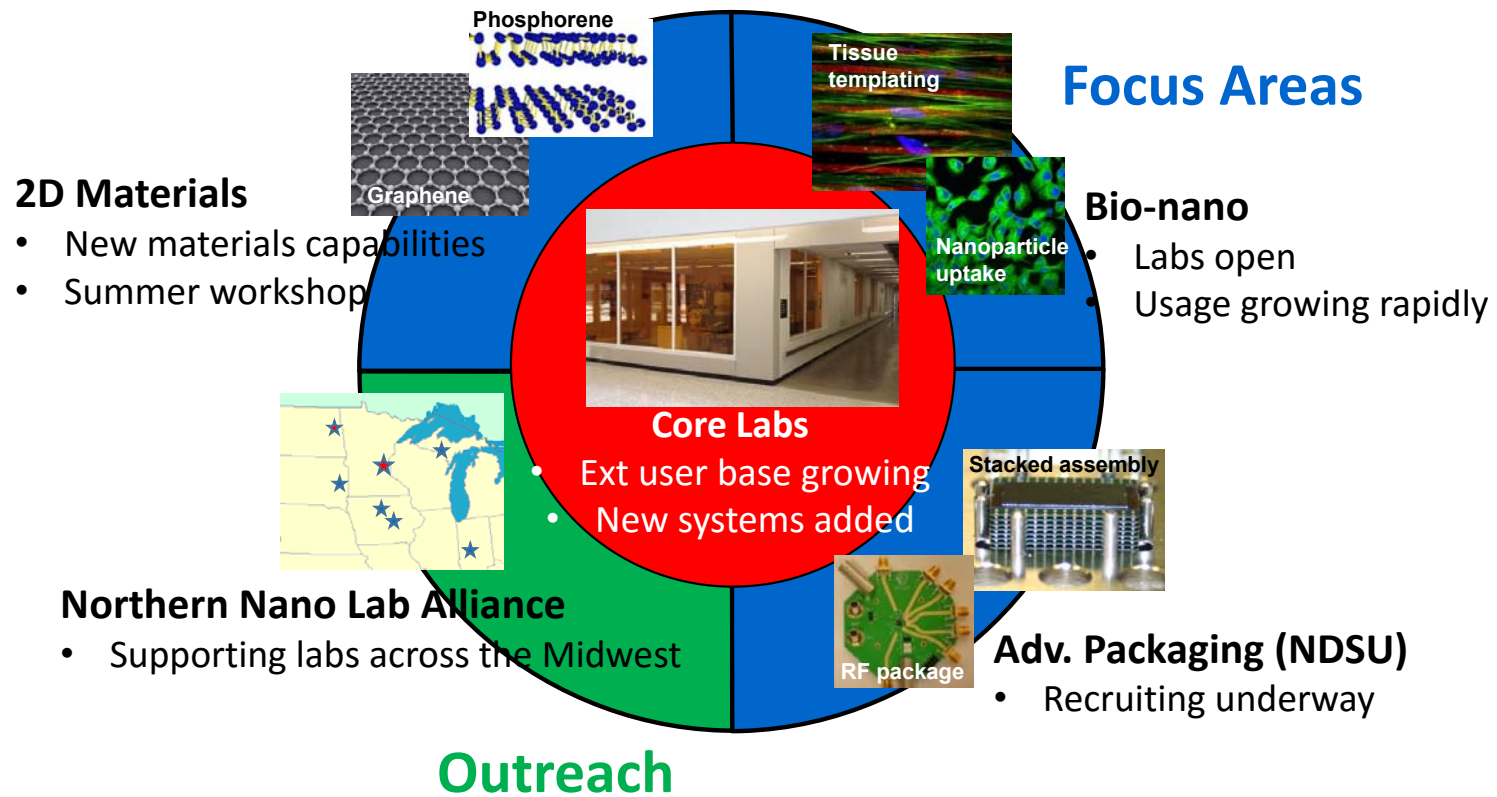
Steve Campbell

Site Director



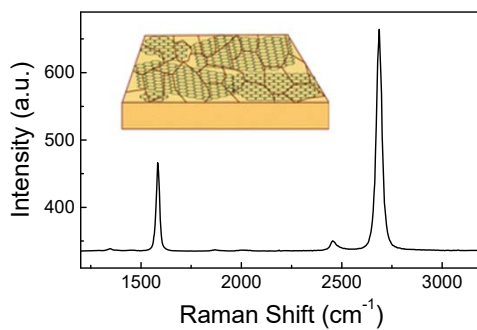
# MINIC Structure

[minic.umn.edu](http://minic.umn.edu)

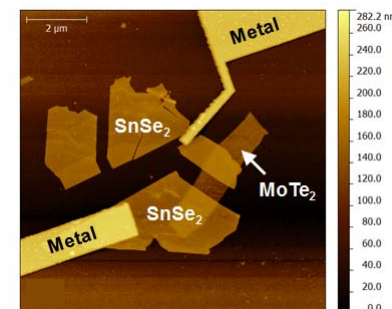


# FA1: 2D Materials Progress

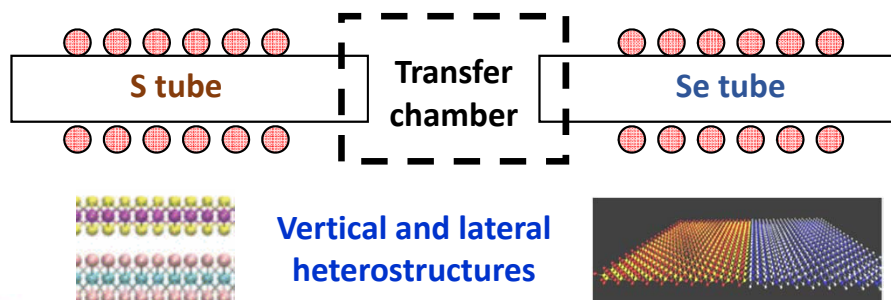
- CVD graphene process now available to all users:



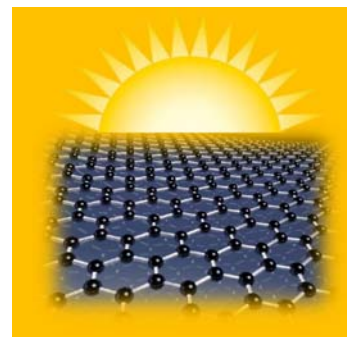
- Environmentally-controlled aligned exfoliation system acquired:



TMD heterostructure growth system ordered and will be installed in Q1 2017:



Hosted 1<sup>st</sup> annual 2D summer school:



# FA2: Packaging Focus Area Progress

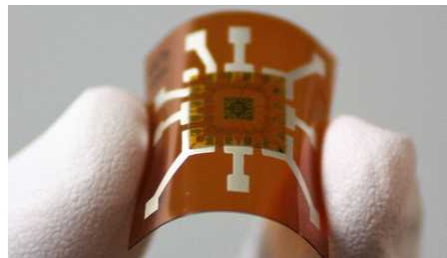
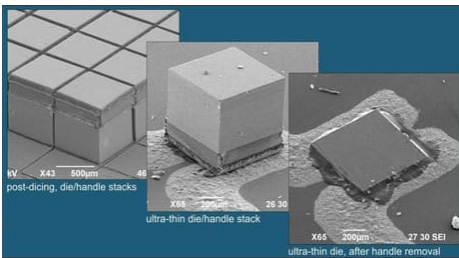
## External Activities:

Updated website and brochure. Compiled contact list, e-mailed, began meetings. Workshops/short courses planned for 2017 including a regional conference with IEEE chapter.

## Uniqarta Inc:

- Develops packaging technology for ultra-thin die on flexible substrates.
- Active member in NextFlex consortium

## FlexChip™ Ultra-Thin Die Assembly



## Internal Activity Highlight:

Three Packaging Lab faculty were awarded “Venture Grants” aimed at commercialization.

## Outreach Activity Highlight:



Hands-on cleanroom packaging workshop for Summer Undergraduate Research Program students.



# FA3: Nano-Bio Focus Area Progress

## Nanomaterials Lab

### ➤ Supported 113 users and their projects

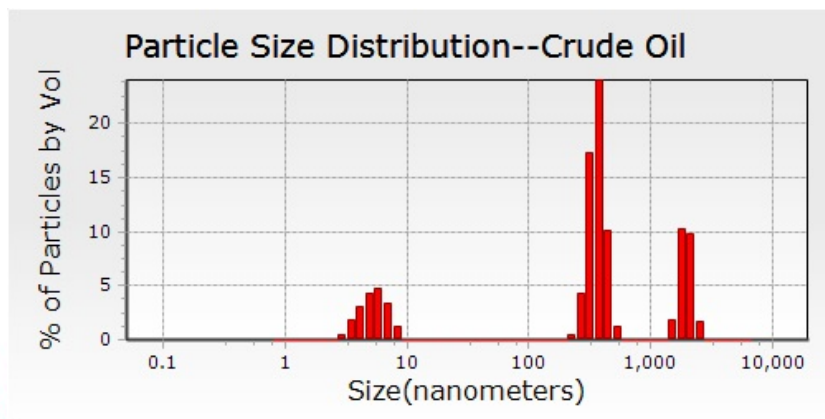
- Nanoparticles: synthesis, analysis
- Biomaterials: analysis of liposomes, viruses, bacteria, algae, cell organelles
- Powders: analysis of drug excipients, ceramics, phosphors, bone cements

### ➤ 24 External Users

## Biomaterials and Life Sciences

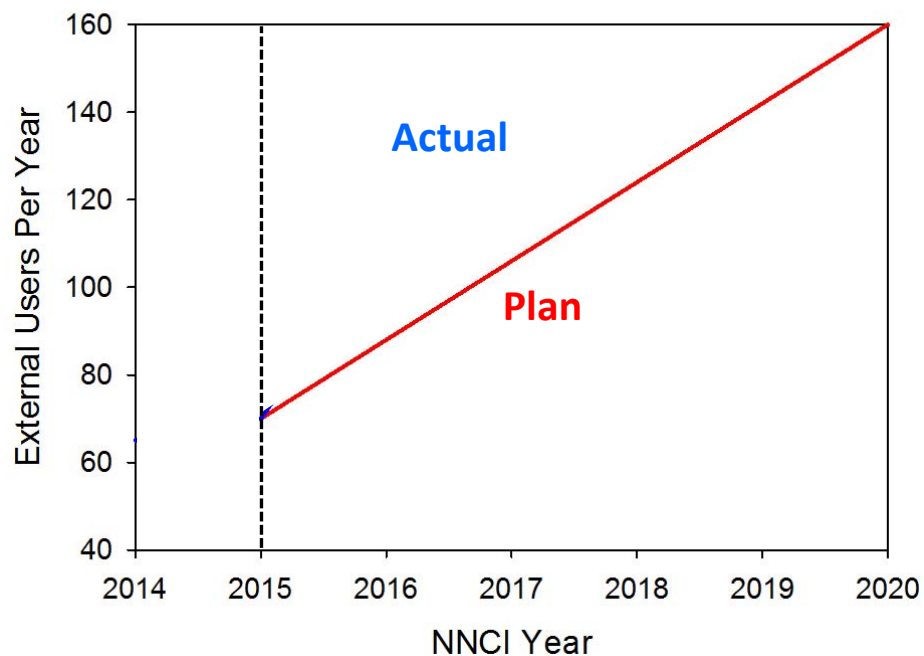
### ➤ RET Project: Cell culture and Imaging

- Cultured human cells, transfected with DNA for green fluorescent protein
- Gold nanoparticles also added to cells
- Imaged labeled cells with fluorescence microscope, laser scanning confocal

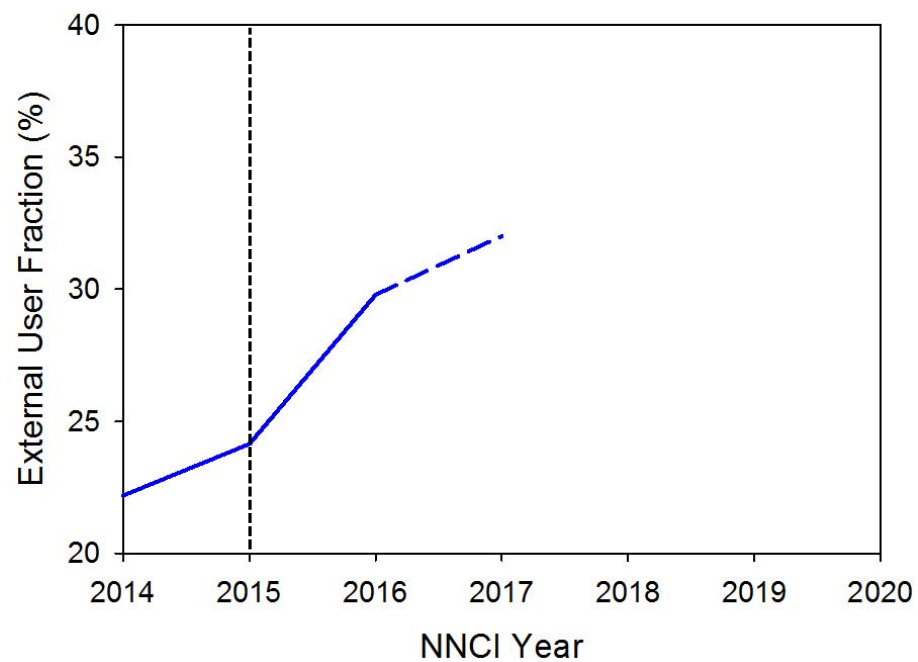


# Node Progress Toward Goals

## External Users



## Fraction of External Users



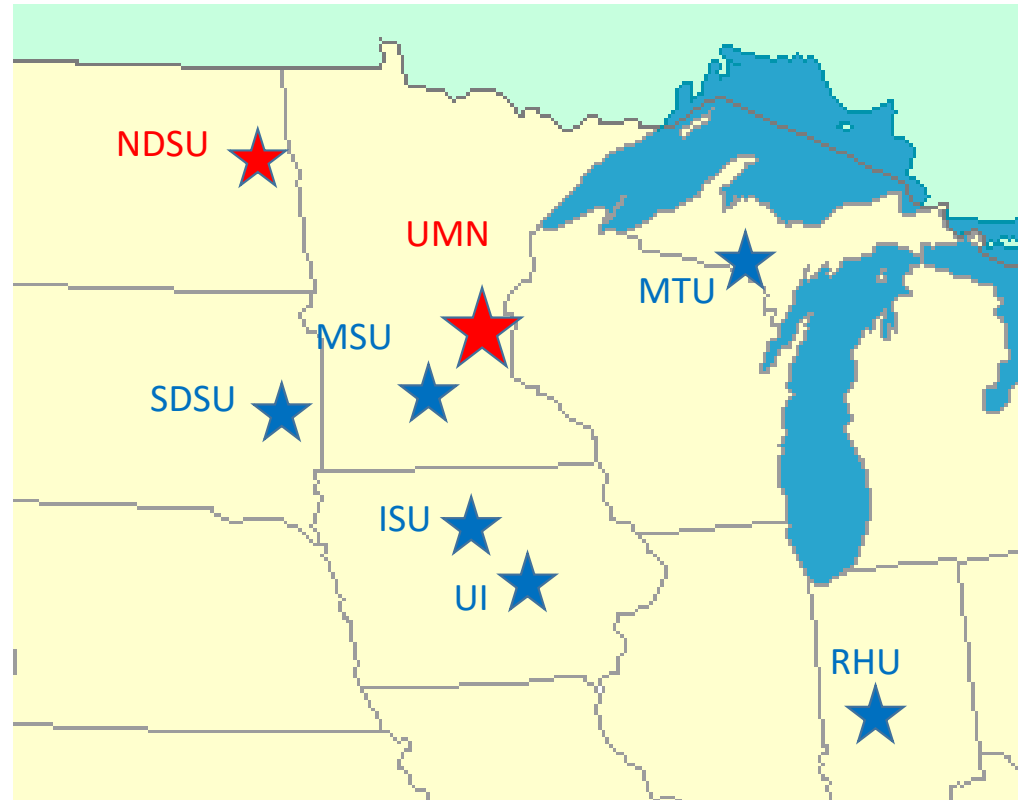
# MINIC: K-12 and Public Outreach Activities

- MINIC has offered classes, camps, tours, and events to over 700 students and 250 members of the public with considerable outreach to under represented groups.



# NNLA - Northern Nano Lab Alliance

- Network of regional university facilities
- Purpose - support nano research and facilities at partner institutions
- Current members
  - University of Minnesota
  - Michigan Tech University
  - Iowa State University
  - University of Iowa
  - South Dakota State University
  - Rose Hulman Inst of Technology
  - Minnesota State University





# Summary

- MINIC is serving users throughout the country, focusing on the upper Midwest
- New Focus Areas are coming online
- External user count is up significantly (projecting 85% increase since start of NNCI). We are constantly looking for ways to improve our performance on this metric.