

## NANOELECTRONICS RESEARCH INITIATIVE: Government-Industry Partnership on University Research

### Replacing Today's Semiconductor

Semiconductor technology advances have allowed ever more sophisticated electronics products for over six decades, but as key critical circuit layers shrink to a few atoms thick, further progress may be impossible. The **Nanoelectronics Research Initiative (NRI)**, managed through the Semiconductor Research Corporation (SRC), supports university research to find a replacement technology to allow faster, smaller, more energy efficient devices beyond the limits of semiconductor technology. The country that is first to develop the new technology will lead the nanoelectronics era much as the U.S. has led the microelectronics era for the past 50 years, and many nations are supporting research programs to gain this advantage.

### Industry, Universities, & Government Partner on the Challenge

The NRI is a unique partnership that includes:

- In addition to directly supporting the NRI centers, the **National Science Foundation (NSF)** accepts NRI funding to jointly fund projects at the NSF Nanoscience Centers across the U.S., which not only leverages NSF's large investments to fuel basic science and support Center students, but also helps promote research in relevant areas for future nanoelectronics innovation.
- The **National Institute of Standards and Technology (NIST)**, which directly supports the four NRI multi-university centers and also lends its metrology expertise. Advancing nano-electronics requires measuring structures with atomic accuracy, characterizing new materials and molecules, and even measuring the signals from individual electrons – if we can't measure it, we can't make it.
- State governments in California, Indiana, New York, and Texas and the City of South Bend are investing in the NRI in recognition of the significant employment benefits that will follow commercialization of nanoelectronic technology.
- AMD, IBM, Intel, Micron, and Texas Instruments contribute millions of dollars, funds that are leveraged with government and university support for an approximate total of \$20 million annually. All dollars support over 30 universities, 75 professors, and 150 students in 20 states.

### FCRP universities are in:

- Alabama
- Arizona
- California
- Colorado
- Connecticut
- Georgia
- Illinois
- Indiana
- Iowa
- Maryland
- Massachusetts
- Michigan
- Nebraska
- New York
- North Carolina
- Oregon
- Pennsylvania
- Rhode Island
- Texas
- Virginia

### Continuing NRI's Success: Action Requested

Since its inception in 2005, NRI has produced 600 technical publications and 19 patent disclosures. Still this basic research is just beginning and the initial efforts are small compared to the government's efforts in the 1940's and 1950's which led to the early semiconductor inventions. Nanoelectronics research must grow significantly over the next several years. Congress should continue to increase the NSF and NIST lab budgets in line with the Administration's doubling path.

# NRI Funded Universities

*Finding the Next Switch*

# NIST



**★** Notre Dame  
Illinois-UC  
Michigan  
Cornell

Purdue  
Penn State  
UT-Dallas  
GIT



**★** SUNY-Albany  
Purdue RPI  
Caltech MIT  
Yale UVA

GIT Harvard  
Columbia  
NCSU



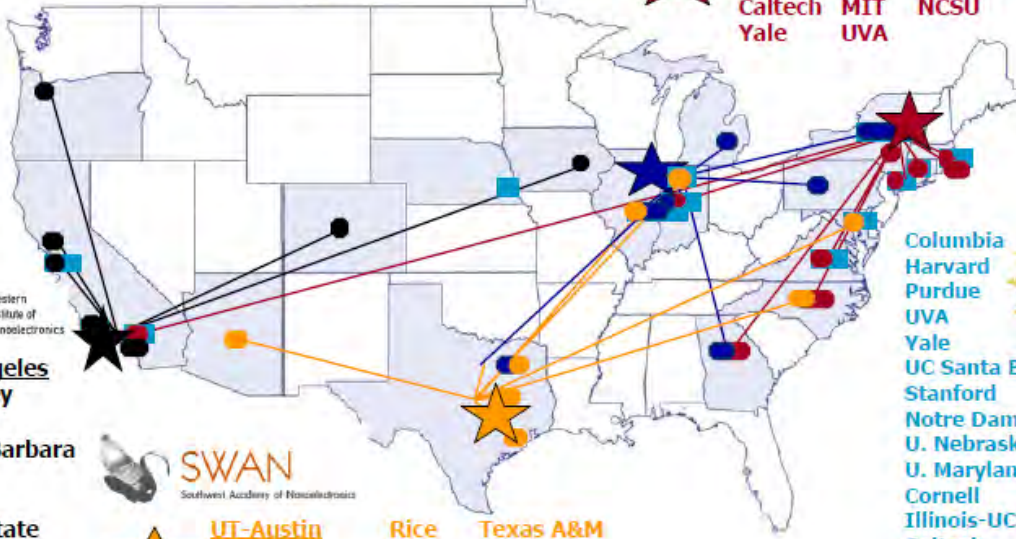
UC Los Angeles  
UC Berkeley  
UC Irvine  
UC Santa Barbara  
Stanford  
U Denver  
Portland State  
U Iowa



**★** UT-Austin Rice Texas A&M  
UT-Dallas ASU Notre Dame  
U. Maryland NCSU Illinois UC



Columbia  
Harvard  
Purdue  
UVA  
Yale  
UC Santa Barbara  
Stanford  
Notre Dame  
U. Nebraska/Lincoln  
U. Maryland  
Cornell  
Illinois-UC  
Caltech  
UC Berkeley  
MIT  
Northwestern  
Brown  
U Alabama



**Over 30 Universities in 20 States**