

## **Public-Private Collaborative Platforms at SRC to Advance Nanoelectronics Research**

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### ***Abstract***

As a leading research consortium in the semiconductor industry, the Semiconductor Research Corporation (SRC) has funded academic research for over 35 years, helped to invent some of the most critical semiconductor technologies, and educated generations of experts and technology leaders for the industry. Through public-private collaborative research platforms provided by SRC, major semiconductor companies have partnered with the US government funding agencies, including NSF, NIST, and DARPA, to sponsor cutting-edge research in the US universities to advance semiconductor technologies. The “Nanoelectronics Research Initiative (NRI)” was co-funded by SRC, NSF, and NIST in 2005 with an ambitious goal – to explore nanoelectronic switches fundamentally different from CMOS transistors to achieve orders of magnitude lower switching energy. A comprehensive benchmarking methodology was developed in NRI to quantitatively evaluate a wide range of nanoelectronic devices. The NRI research revealed that it is important to co-optimize nanoelectronic devices and architectures, which led to a new NSF-SRC joint program in 2018 known as the “Energy-Efficient Computing from Devices to Architectures (E2CDA)”. Based on the learning from NRI, the current “Nanoelectronics Computing Research (nCORE)” program continues the SRC-NSF-NIST partnership to explore novel materials, devices, and computing paradigms based on a holistic approach. SRC also has a long history to partner with DARPA to fund large multi-university centers to address critical challenges in microelectronics and nanoelectronics, from “Focus Center Research Program (FCRP)”, to “Semiconductor Technology Advanced Research Network (STARnet)”, and to the current “Joint University Microelectronics Program (JUMP)”.

These programs have greatly advanced nanoelectronics research in the US with far-reaching impact on the global scale. The public-private partnership not only provides funding leverage to attract participants in the private sector to support university research, but also fosters a synergistic relationship between fundamental research and industrial applications. As the industry increasingly relies on fundamental research for disruptive technologies in the post-CMOS era, this public-private partnership for nanoelectronics research will become even more essential for maintaining the US competitive advantages in semiconductor technologies in the future.