

# CONNECTIONS

LATEST NEWS AND UPDATES FROM  
SEMICONDUCTOR RESEARCH CORPORATION



## SemiSynBio Researchers Design New DNA Data Storage

Researchers at the University of Illinois Urbana-Champaign, the University of Massachusetts at Amherst, and Stanford University have collaborated to extend the “molecular alphabet” of DNA and transform it into a modern data storage system. The research, which was funded in part by the SRC SemiSynthBio Consortium, aims to advance the potential of DNA data storage.

According to the researchers, just one gram of DNA could store several petabytes of data. This makes DNA a potentially game-changing storage medium that could decrease the resource demands of current data storage methods.

The team combined four natural and seven chemically modified nucleotide bases to create novel single-stranded DNA molecules. Each base was assigned a binary code representing the data in need of storage. They then used AI and machine learning to design a method to read the information stored on the DNA strands. *Mycobacterium smegmatis* porin A (MspA) nanopores were able to “read” the combination of natural and modified bases with over 60% accuracy.

The researchers concluded that the newly expanded nucleotide base alphabet could potentially increase storage density by almost 2-fold, paving the way for the future expansion of non-traditional storage. Read more here >> [eurekaalert.org/news-releases/945335](https://eurekaalert.org/news-releases/945335)

READ ON FOR MORE  
NEWS AND UPDATES!

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## CRISP Center PI to Co-Lead New Center

CRISP center PI [Kevin Eliceiri](#), an associate professor of [biomedical engineering](#) and [medical physics](#) at UW-Madison, and [Paolo Provenzano](#), an associate professor of biomedical engineering



at the University of Minnesota, will lead the Center for Multiparametric Imaging of Tumor Immune Microenvironments.

The team will apply advanced optical imaging, nano- and microfabrication, and biophysical modeling techniques to look at the microenvironment of tumors plus the cell types. This will help researchers see how microenvironments influence immune function. Read more >> <https://bit.ly/3JJrR29>

## Purdue Named One of Fast Company's "Brands That Matter"

Purdue is the only university represented on the list of 95 internationally-recognized Fast Company brands, including Nike, Zoom, Yeti, and other influential conglomerates, companies, and nonprofits. Read more >> <https://bit.ly/3IOHGDv>



## New Research Published by HWS PI Detects Side-Channel Vulnerabilities

A team led by Hardware Security PI Tuba Yavuz recently published a paper in IEEE Transactions on Dependable and Secure Computing. The researchers developed a precise side-channel analysis tool, ENCIDER,



that can detect both timing and cache side-channel vulnerabilities within SGX applications. It does this by extrapolating potential timing observation points and using the SGX programming model during analysis. Read more >> <https://bit.ly/38ca4Tp>

## Young Faculty Award Winner Publishes New Book



SRC's first recipient of the Young Faculty Award, Dr. Shimeng Yu, has written a new book on Semiconductor Memory Devices and Circuits.

Yu, an Associate professor of electrical and computer engineering at the Georgia Institute of Technology, intends for the book to be a resource for graduate students in electrical engineering programs, and for researchers and professionals in the semiconductor and microelectronics industries.

## SRC-Funded TxACE Team Develops THz Imager Microchip

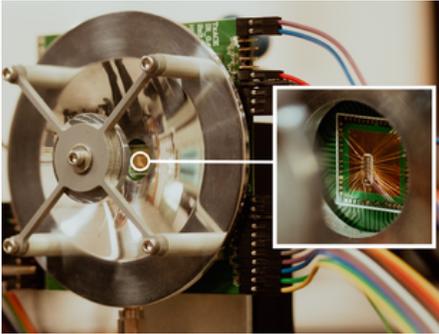


Image Credit: University of Texas at Dallas

A team of researchers at the University of Texas at Dallas and Oklahoma State University are working on a terahertz imager microchip that could allow devices to “see” through obstructions like smoke, fog, or other conditions that reduce visibility, without using an external lens. This innovative technology combines a microchip with a reflector that increases the quality and distance capability of the imaging while decreasing the amount of power used. One application of the device could be to help self-driving vehicles detect objects like bicyclists, pedestrians, or other vehicles in their paths. The research was led by Dr. Kenneth K. O, director of the [Texas Analog Center of Excellence \(TxACE\)](#), at UT Dallas.

## Huang Publishes at ISSCC

Chi-Hsiang Huang, PhD student at the University of Washington, has published new research at ISSCC which presents "an approach to minimizing the total energy drawn by aggressively duty-cycled low power systems," according to Huang's advisor, Dr. Visvesh Sathé. The research was funded by SRC in collaboration with liaisons from ARM and Intel,



## Purdue, Binghamton University Lead Major SRC Centers



The Center for Brain-Inspired Computing Enabling Autonomous Intelligence (CBRIC) and the Center for Heterogeneous Integration Research on Packaging (CHIRP) are both being led by researchers from Purdue University. Center Director Kaushik Roy and Assistant Center Director Anand Raghunathan currently lead CBRIC while Co-Directors Ganesh Subbarayan (Purdue University) and Baghat Sammakia (Binghamton University, SUNY) are in charge of CHIRP. Together, the programs generate millions of dollars worth of SRC-supported research.

## Yu Gives Year In Review at IRPS 2022

2019 SRC Young Faculty Award Winner Shimeng Yu delivered the 2022 International Reliability Physics Symposium Year in Review about emerging memory. This year's IRPS was held March 27-31 in Dallas, Texas. Read more >> <http://www.routledge.com/9780367687076>

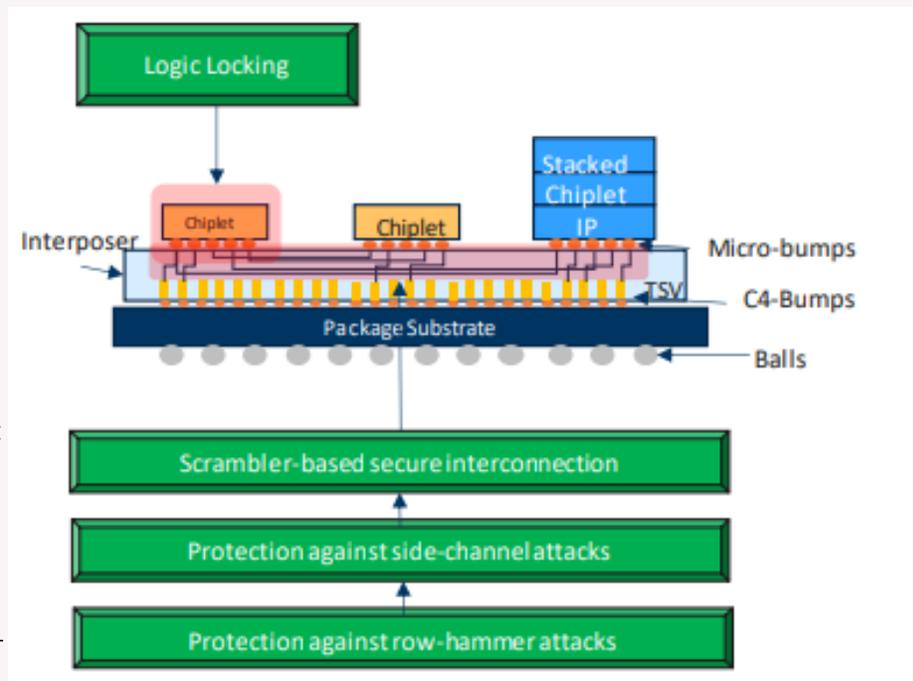


## Tech Transfer Series

### Integrated Circuit Protections to Secure 2.5D/3D Integrated Circuits Against IP Theft

In collaboration with Intel, IBM, and AMD, [Hardware Security \(HWS\) researchers \(2994.001\)](#) Krishnendu Chakrabarty and [Jonti Talukdar](#) from Duke University have filed a [patent](#) on “Integrated Circuit Protections Against Removal and Oracle-Guided Attack” to secure 2.5D/3D Integrated Circuits (ICs) against IP theft. with dynamic obfuscation. Their IP protection solution, with proposed low-cost Built-in-self-test (BIST) Locking technique,

improves heterogeneous integration system resilience against both oracle-free attacks including sequential SAT and Machine Learning (ML) guided attacks. As 2.5D/3D integration is currently identified as one of the most promising alternatives to sustain Moore’s law, The proposed solution is crucial to ensure the security of current 2.5D/3D heterogeneous integration systems, from edge devices to cloud servers, by strengthening data interconnection through BIST Locking and further preventing data-leakage through inter-chiplet interconnects on integrated interposers.



### Top 5 SRC Publications Viewed Across All Programs

Don't miss the papers that received the most views on the SRC website over the last six weeks. Members of the associated programs have early access to the pre-publications.

- How Do We Quantify the Application-Level Benefits of a New Technology? A Fundamental Question For Ascent - [SRC Publication P106273](#)
- Technologies for Neuromorphic Computing: Cross-Layer Interactions and Design Insights - [SRC Publication P105307](#)
- Advanced Gate Stack Design of Ferroelectric Transistor for Scaling towards 7nm FinFET Platform - [SRC Publication P103656](#)
- Voltage & Current Controlled Nanomagnetism for Memory and Logic - [SRC Publication P106264](#)
- Interface Resistance between Directional Interconnect Conductors and Liners - [SRC Publication P106477](#)