Presented by the UB Center for Advanced Semiconductor Technologies

3D INTEGRATION OF 2D DEVICES FOR ADVANCED MEMORY, LOGIC, & BIO-INSPIRED COMPUTING



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PENNSYLVANIA STATE UNIVERSITY **Abstract:** In this presentation, I will delve into the exciting realm of monolithic 3D integration, where emerging 2D FETs take center stage, empowering advanced memory, and logic devices. Furthermore, I will also discuss our work on bio-inspired neuromorphic computing. Notably, our recent breakthroughs have culminated in the successful demonstration of wafer-scale 2-tier and 3-tier 3D integration, utilizing MoS2 and WSe2 FETs as the building blocks. These achievements have paved the way for multifunctional circuits that hold immense promise for the future of electronics. Delving deeper into our research, we have harnessed the potential of 2D materials to design solid-state devices with low power consumption mimicking auditory processing in barn owl, collision avoidance in locust, and probabilistic computing in dragonfly. By combining the power of 2D materials with bio-inspired principles, our work lays a solid foundation for the creation of highly compact and functionally diverse integrated circuits in the revolutionary third dimension. The implications of this technology are far-reaching and hold the potential to shape the future of electronics and computing.

Bio: Dr. Das received his B.Eng. degree (2007) in Electronics and Telecommunication Engineering from Jadavpur University, India, and Ph.D. degree (2013) in Electrical and Computer Engineering from Purdue University. He was a Postdoctoral Research Scholar (2013-2015) and Assistant Research Scientist (2015-2016) at Argonne National Laboratory (ANL). Dr. Das joined the Department of Engineering Science and Mechanics (ESM) at Penn State University in January 2016. Dr. Das was the recipient of Young Investigator Award from United States Air Force Office of Scientific Research in 2017 and National Science Foundation (NSF) CAREER award in 2021. Das Research Group at Penn State leads a new multidisciplinary area of science, namely biomimetic sensing, neuromorphic computing, and hardware security based on 2D materials and devices.

2:00pm, Friday, February 2, 2024

LOCATION:

DATE / TIME:

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230 A Davis Hall

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