

## **Green Electronics to Gray Matter: Ghost Walks, Mind Blowing and Brain Doping**

**Abstract:** While the computing demands of Information Technology are ever increasing, the capabilities of electronics have hit fundamental walls due to energy and dimensional unscalability. In this talk, I will demonstrate the quantum mechanical transistor, which beats the fundamental energy limitations. This device is the world's thinnest channel (6 atoms thick) sub-thermal tunnel-transistor. Thus, it has the potential to allow dimensional scalability to beyond Silicon scaling era and thereby to address the long-standing issue of simultaneous dimensional and power scalability.

Going beyond electronic computation, I will discuss about the biological computer: the brain, which can be thought of as an ultimate example of low power computational system. I will introduce the technology, which reveals for the first time, a nanoscale trans-synaptic architecture in brain and the way mother nature has engineered biomolecular organization in the brain to optimize its computing efficiency. This technology can also be used to decipher intriguing biomolecular nanoarchitectures related to neurological diseases, otherwise invisible to existing technologies.

I will conclude with our group's research vision for how extremely powerful technologies can be built by fusing diverse fields and discuss briefly about the research directions of my new lab at MIT.

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- [5] D. Sarkar et. al., *Appl. Phys. Lett.*, 100 (14), 143108, 2012;