



Introduction to DNA electronics and its potential applications

by Ir. Dr Lim Kok Sing

Ir. Dr Lim Kok Sing is currently a co-opted member in Electronic Engineering Technical Division (eETD).

The Electronic Engineering Technical Division (eETD) has successfully organized an evening webinar on “Introduction to DNA electronics and its potential applications” via Online Platform. The speaker was Dr Vengadesh from Dept of Physics, Fac of Science, University of Malaya, Kuala Lumpur. The webinar was attended by 10 participants, 1 moderator and Dr Vengadesh.

Dr Vengadesh started his presentation with the Background theory and history of DNA and Nuclei Acid. The scientists who discovered DNA, James Watson, Francis Crick and Maurice Wilkins who were also the Nobel Laureates were introduced. After that, the electrical and magnetic properties of different nuclei acids, as well as the semi-conducting characteristics (I-V characteristics) were presented and how these properties could be exploited for the applications, particularly the electronics such as Schottky Junctions and biosensing applications. Dr Vengadesh also shared some of his recently work on the development of rapid DNA/RNA/protein detection model – a solid-state sensor for the detection and identification of virus, bacteria, fungus and other organisms.

Dr. Vengadesh also shared one of his research projects on Lab on Chip point-of-care device for combating antibacterial resistance and detection of diseases. In-line with this, research directions are therefore directed towards understanding interfacial electronic and electro/biochemical properties by deciphering extracted bio-signals to be applied in the fields of nano-bioelectronics, nanomedicine and biomedical technology.

Dr Vengadesh received some questions from participants on the DNA/RNA electronics and detection technology. It was educational presentation by Dr Vengadesh and at the end of the session, a group photo on screen was taken before the end of the webinar.

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Starting Question: What is DNAe?

Manipulation of electronic properties of DNA for next generation hybrid technology for applications In Physics, Biology, Medicine, Biotechnology etc

Interrogation and understanding of charge transfer mechanisms in DNA

Physics + Biology + Chemistry multi-disciplinary approach for DNA research





Participants: Cheong Wei Wei, Kok Sing Lim, Chan Teo Yu, Kok Sing Lim, Saw Ewe Leong, Nur Kusaira Ikra..., CheeWP, Wee Hean Ng

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We employed 2 novel ideas:


1. **capillary-force-induced flow** of DNA- Ag molecules towards controlled scribing and
2. **enzymatic etching** of DNA scaffolding material on the silicon wafer by using DNase I and finally by a rinse in deionized water removes the still remaining fragmented DNA molecules. Which becomes more hydrophilic.

We used a novel scribing or "writing" method for fabricating micro- to nanoscale silver (Ag) wires on a silicon (Si) wafer using natural capillary force.

The coffee-ring drying effect fueled by the capillary force allows the diffusion of Ag-loaded DNA molecules towards the edge of the scribing.



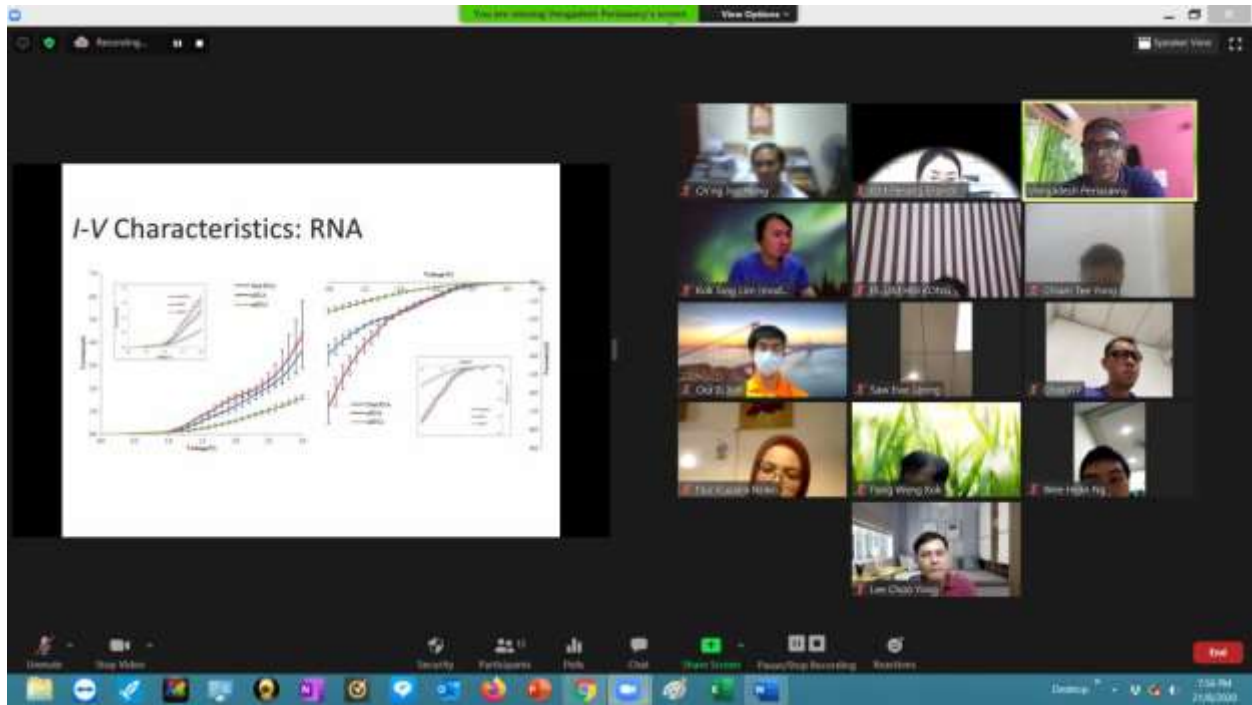
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Group photo and one of Dr Vengadesh Presentation slides.