PRESENTER INFORMATION

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BIOGRAPHICAL SKETCH

Dr. Itır Köymen received the MEng degree (Hons.) in Electronics and Electrical Engineering from The University of Edinburgh, Edinburgh, UK, in 2010, and her PhD in Bioengineering from Imperial College London, London, UK, in 2014. She worked as a postdoctoral researcher at Bilkent University between 2015-2019 where she conducted research on memristive device dynamics and characterization and collaborated with the CMUT (Capacitive Micromachined Ultrasonic Transducer) Group. In 2019 she joined the faculty of TOBB University of Economics and Technology (TOBB ETU), where she is currently an Assistant Professor with the Department of Electrical and Electronics Engineering. She is also a researcher at TUBITAK UME since 2020. Her research interests include fabrication, characterization, the modelling, and applications of micro-nanometric nonlinear devices, and analog circuits for and inspired by biology.

TITLE: Characterisation and Applications of Metal Oxide Memristive Devices

ABSTRACT:

The memristor was first hypothesized in 1972 based on a symmetricity argument and was dubbed the fourth fundamental circuit element. The device itself and materials exhibiting memristive dynamics have been subjects of heated research activity. Memristors are now recognized as emerging memory devices suitable for neuromorphic applications, brain-inspired computing, hybrid complementary metal-oxide-semiconductor (CMOS) + memristor circuits.

Performance of integrated circuits (predominantly made of CMOS technology) has been following an exponential trend known as Moore's law for the last forty years. However, now that physical boundaries have been reached, novel approaches including the utilization of emerging devices, which enable smaller footprint, low power consumption, memory properties, have become eminent.

Transition metal oxides are among the most frequently used active layers that make up memristive devices. Valence change memories (VCM) exhibit input dependent high (or low) resistive states due to ionic movement. Following an input signal, a highly conducting filament(s) forms which sets the device, application of an opposite input leads to the dissolution of the filament and thus resets the device back to its more resistive state.

This talk will describe memristive device fabrication, characterization, modeling of device behavior and applications to analog circuits.