

OPEN SEMINAR

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Title: Characterization of Organic Thin Film Transistors using an Asymmetric MIS Capacitor

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Place: Samtel Centre Seminar Room (access from ground level)

Abstract: Organic thin-film Transistors (OTFT) are being actively studied due to their potential for low-cost fabrication of electronic systems on flexible substrates like plastic, paper and fiber using roll-to-roll printing processes. The development cycle of an OTFT requires large number of iterations between process modifications and device fabrication & characterization to tune important transistor parameters such as mobility, threshold and turn-on voltage etc. Fabrication of a complete transistor is relatively complex and its characterization also requires three terminal measurements which hinders the process of device optimization. In this work, an easy to fabricate, two-terminal, asymmetrical Metal-Insulator-Semiconductor (AMIS) device is proposed as a test structure to obtain transistor parameters. The capacitance-voltage characteristics of this highly asymmetric capacitive structure originates primarily from the channel and its contribution at any given frequency depends on mobility and threshold voltage thereby allowing their extraction. Simulation and experimental results are presented that demonstrate that these parameters can be reliably extracted and used to predict current-voltage characteristics of the transistor as well. Besides simplicity, an important advantage of the proposed technique is that use of low frequency of measurement ensures that measured characteristics originate from a very large channel area making the measurement robust to presence of series contact resistance.