

## **CNTFET-based HF electronics – State-of-the-art and future prospects**

Professor Michael Schroeter

Technical University Dresden

**2:00 PM, Thursday, May 23, 2019**

**Birck Nanotechnology Center Room 2001**

This talk presents an overview on the state-of-the-art and the feasibility of carbon nanotube field-effect transistors (CNTFETs), with a focus on high-frequency (HF) applications, from an engineering point of view. The advantages of employing CNTs as channel material versus incumbent and other emerging materials are discussed. Multi-finger multi-tube device structures, meeting the requirements of HF applications with their typical 50 Ohm impedance environment, and the status of their fabrication are presented. Technology computer-aided design (TCAD) enabled by multi-scale simulation tools covering physical effects in detail at the atomistic level up to compact models for CNTFET circuit design and simulation will be briefly touched upon. Case studies, such as the exploration of process and material options for optimizing the linearity of the transfer characteristic, will highlight the importance of TCAD for process technology and compact model development. Selected examples for experimental results of important DC and HF characteristics of fabricated devices and a first GHz amplifier circuit will be shown, demonstrating the accuracy of our present CNTFET compact model for the design of analog HF circuits. The talk will conclude with an outlook on the achievable performance of CNTFETs along with a discussion on the most important existing fabrication challenges and roadblocks.

Michael Schröter received his Dr.-Ing. degree (1988) and *venia-legendi* (1994) in electrical engineering from Ruhr-University Bochum, Germany. He held engineering and management positions at Nortel/BNR in Ottawa, Canada, and at Rockwell and RFNano in Newport Beach (CA). Since 1999, he has been a Full Professor at Technical University Dresden, Germany. He was a co-founder of XMOD Technologies in Bordeaux, France, the Technical Project Manager for DOTFIVE and DOTSEVEN, and has led the Carbon Path project within the Excellence Cluster CfaED. He is presently a member of the ITRS/IRDS RFAMS subcommittee and the BCICTS ExCom and TPC. He has co-authored over 240 publications and two textbooks, and is the developer of the industry standard HBT compact model HICUM.

