SEMINAIRE EXCEPTIONNEL

de 13 h à 14 h, salle Belledonne, IMEP-LAHC, MINATEC,

ouvert à tous : enseignants, étudiants, chercheurs, administratifs, techniciens)

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"Transformational Electronics for Smart Living and Sustainable Future"

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Abstract: Complementary growth of information technology and silicon CMOS has advanced today's digital world. Looking forward we will see unusual applications of them focusing on Internet of Things (IoT). Transformation of materials, device architecture, waste materials can serve both purposes [Nano Lett. 2011, 2012, ACS Nano 2013, Sci. Rep. 2012, NPG Asia Mat. 2014, APL 2013, IEEE TED 2013, 2014]. Using conventional CMOS processes, we have introduced the concept of transformational electronics. While retaining high performance, energy efficiency, multi-functionality due to ultra-large-scale-integration (ULSI) density and low-cost, we bring life to formerly dead piece of electronics by integrating web into it. Our objective is to discover new application areas for electronics and web to integrate physical electronics with our daily life through cloud computation, big data, cyber-physical system, ultra-mobile computation and virtual reality. In my talk I will focus on our effort to transform traditional bulk mono-crystalline silicon (100) based electronics into flexible-stretchable-transparent-reconfigurable one. Compared to other demonstrations based on organic electronics, transfer printing, back grinding, or use of ultra-thin flexible silicon – our *trench-protect-release-reuse* process has complementary advantages from thermal budget, integration density and more main-stream fabrication perspective. We have demonstrated various electronics including metal-oxide-semiconductor devices, energy harvester, storage, fully integrated advanced healthcare devices and such [Adv. Mat. 2014 – cover article, ACS Nano 2014, Sci. Rep. 2013, Small 2013 - frontispiece, IEEE TED 2013, APL 2013, 2014, pss-RRL 2013, 2014, MEMS 2012, 2014, etc.]. We view the process holds promise for further expansion and consider the exercise of fabricating various building blocks of electronics opens up opportunity for multi-disciplinary collaborative effort towards integrated systems focusing on sustainable future and smart living.

Dr. Muhammad Mustafa Hussain *(PhD, University of Texas at Austin, Dec 2005) is an Associate Professor of Electrical Engineering in KAUST. Before joining KAUST in Aug 2009, he was Program Manager of Novel Emerging Technology Program at SEMATECH, Austin, Texas. His program was funded by DARPA NEMS, CERA and STEEP programs. A regular panelist of US NSF grants reviewing committees, Dr. Hussain is the Editor-in-Chief of Applied Nanoscience (Springer) and an IEEE Senior Member since February 2010. He has 179 research papers (including 16 invited and 12 cover articles). Prof. Hussain has given 57 invited talks and has offered 3 tutorials in international conferences. He has 15 issued and pending US patent applications. His 4 PhD graduates have landed researcher positions in UC Berkeley, UIUC, UC Davis and in DOW Chemicals. His students have won multiple research awards including DOW Chemical SISCA Award 2012, World Intellectual Property Award 2013. Dr. Hussain is an IEEE Electron Devices Society Distinguished Lecturer and a Fellow of Institute of Nanotechnology, UK.*

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