

“BNC Seminar”

January 29th, 2014 @ 12:00noon
BRK, ROOM 1001

Muhammad Mustafa Hussain

Associate Professor of Electrical and Engineering in
King Abdullah University of Science and Technology (KAUST)

Title: Transformational Silicon Electronics

Bio: Dr. Muhammad Mustafa Hussain (PhD, University of Texas at Austin, Dec 2005) is an Associate Professor of Electrical Engineering in King Abdullah University of Science and Technology (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. He has 157 research papers (including 9 cover articles) and several issued and pending US patents. His students have won several research awards including *DOW Chemical SISCA Award 2012*. Dr. Hussain is an *IEEE Senior Member* and *Electron Devices Society Distinguished Lecturer*.

Abstract: Complementary growth of silicon electronics and information technology has played critical role for today's digitized world. During that growth, I have had the opportunity to work on state-of-the-art CMOS compatible integration of various planar and non-planar devices like high-k/metal gate based planar CMOS and non-planar FinFET, nanoelectromechanical switch (NEMS), and recently silicon nanotube field effect transistors. The role of such electronics will have continued impact. At the same time, in the coming years, one of the promising expansion areas for traditional silicon electronics can be its flexible version. Therefore, in my talk I will focus on our effort to transform traditional bulk mono-crystalline silicon (100) based electronics into flexible and semi-transparent 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 and such. 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.