

EE 298-12
Solid State Technology and Devices Seminar

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1-2pm
Hogan Room - 521 Cory Hall

Integrated Nanotechnology for Sustainable Future and Smart Living

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ABSTRACT:

We live in a high-paced world where information technology and electronics play critical role. Our dream at Integrated Nanotechnology Lab @ KAUST is "Information for anyone, anywhere, anytime". Information is vital for sustainable future and smart living. Quality food, purified water, natural environment and clean energy are necessities for sustainable future. In addition, quality healthcare, secured financial system and safety of life and wealth are integral components of smart living for a prosperous world for us and our future generation. Information gathering through highly sensitive and selective sensors, information storage in ultra-high capacity memory, information processing through ultra-high performance computation at ultra-low power and information dissemination via error-free seamless communication medium is not fancy anymore rather a necessity to ensure such sustainable future which offer all of us an affordable smart living. Thus, we are focused in our Integrated Nanotechnology Lab at KAUST to strive for energy efficient smart living and sustainable future by homo and heterogeneous integration of advanced nano-materials using state-of-the-art CMOS compatible (batch fabrication at an affordable price) micro and nano-fabrication processes to build and study advanced micro and nano-scale devices for:

- High performance computation with longer battery lifetime and area efficiency for enhanced functionality by developing conventional channel material (Si, SiGe, etc.) based nanotube field effect transistors. Specifically we study the interplay between the structural transformation and device characteristics. [1-6]
- A generic and regenerative low-cost batch process for transforming any conventional CMOS circuitry on bulk silicon (100) into flexible and transparent one. [7-12]
- Thermoelectric windows (30W/m² at 20C temperature difference) and micro-scale microbial fuel cell integrated with MWCNT and graphene as rapid test bed for water purification and micro-scale power generation. [13 – 15]