



# COLLEGE OF ENGINEERING

## SEMINAR ANNOUNCEMENT

### **“Design and modeling of very high-efficiency multijunction solar cells and future research direction at Tennessee Tech”**

#### **Abstract**

The main challenge in the solar cell industry is making the solar cells more cost effective. Mono and polycrystalline Si, CdTe, CIGS, Quantum dot, Organic and Dye-sensitized solar cell technologies do not produce high efficiencies. A low bandgap semiconductor generates larger current due to photon absorption over broader spectral region but do not produce high open circuit voltage because it is limited by the dark current of the low bandgap material. We will discuss a novel antimony based quadruple junction solar cell comprised of AlGaInP/InGaAs/GaSb/InGaSb semiconductor subcell layers. Simulation of quantum efficiency, current density vs. voltage, power density and comparative study of photon absorption of the novel design with state of art single junction and multijunction solar cells will be discussed. Antimony based subcell layers help in higher photon absorption in the IR region. The combinations of subcell layers yield favorable photon absorption for the entire solar radiation spectrum. We will also discuss about my future research direction on battery storage (Li-air/Li-ion and Al-ion/Al-air) at Tennessee Tech University.

#### **About the Speaker**

Indranil Bhattacharya is a newly appointed Assistant Professor of Electrical and Computer Engineering Department at Tennessee Tech University. Dr. Bhattacharya is also associated with Center for Energy Systems Research. He received his Ph.D. and M.S. degrees in Electrical Engineering in 2013 and 2009 respectively from the Florida State University. He received Bachelor of Engineering degree in Electronics and Communication Engineering in First Class with Distinction from India. Dr. Bhattacharya worked as an Adjunct Professor in the Electrical and Computer Engineering Department at the Florida State University since 2011 January, prior to his appointment at Tennessee Tech University. He is the main inventor of 2 US patent applications. He has published several technical papers in IEEE.

#### **Research Interests**

High-efficiency III-V solar cells, energy storage (batteries and fuel cells), semiconductor electronics, photonics & optics, electromagnetics, medical electronics, digital & mixed-signal ICs and power electronics.

**Date: December 05, 2013**

**Time: 12 P.M. – 1 P.M.**

**Location: Prescott 225**