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SEMINAR

Advanced Silicon Photovoltaics: The Next Generation of Manufacturing Processes and Characterization Techniques

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2:30PM — 3:30PM

Harris Corporation Engineering Center Room 101A

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In recent years, photovoltaic (PV) systems have emerged as a cost-competitive alternative to traditional energy sources like coal and nuclear power. PV represented 20% of new global electricity installations in 2015 and is now a »$100 billion per year industry. Within the PV sector, crystalline silicon (c-Si) PV cells and modules dominate the market with >90% market share. c-Si PV is a platform for innovation with a stream of new materials (e.g., passivation layers, optical coatings, contact materials), novel manufacturing processes, and powerful characterization techniques currently being explored by industry and academia.

Thin oxide films are versatile materials that can simultaneously enable efficiency gains and cost reductions in c-Si PV cells. In this seminar, the deposition of different oxide materials (e.g., titanium oxide, aluminum oxide, intrinsic and doped silicon oxide) using atmospheric pressure chemical vapor deposition (APCVD) and the integration of these materials into PV cells will be presented. Additionally, future areas of research, including the use of APCVD to deposit hole-selective passivated contacts and transparent conductive oxides will be discussed.

Materials and device characterization techniques are critical when developing new manufacturing processes. This seminar will also highlight recent advances in metrology for c-Si PV manufacturing, from fundamental investigations of the structure and composition of interfaces within these devices to the use of luminescence imaging as a means of performing detailed loss analysis of industrial PV cells.

Biography: Dr. Kristopher O. Davis received his B.S. in Electrical Engineering from the University of Central Florida (UCF) in 2007. Then he became a Research Engineer at FSEC providing PV cell and module characterization services to a number of different organizations, including module manufacturers, accredited qualification laboratories, national laboratories, and others. Additionally, he worked with the National Renewable Energy Laboratory (NREL) on quantifying degradation rates in PV modules installed in the field and helped manage a U.S. Dept. of Energy (DOE) funded project focused on the development and demonstration of advanced inverters with unique features attractive to utilities.

Dr. Davis received his Ph.D. in Optics & Photonics from UCF in 2015 where he focused on the deposition of functional oxide materials using APCVD and the integration of these materials into c-Si PV cells. This collaboration between UCF and SCHMID Group, a producer of PV manufacturing equipment, gave Dr. Davis firsthand experience on solar cell manufacturing processes in a state-of-the-art R&D pilot production facility.

Currently, Dr. Davis is the c-Si Metrology Program Manager for the U.S. Photovoltaic Manufacturing Consortium (PVMC), a DOE funded initiative in collaboration with SEMATECH. In this capacity, Dr. Davis works with a number of companies across the U.S. PV supply chain to better understand the challenges facing c-Si metrology and develop solutions to these problems through collaborative R&D. Dr. Davis is also now leading a new DOE project focused on developing APCVD processes for metal oxide passivated contacts.

For further information please click link below:
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