



San Antonio Nano Tech Forum

SANTF Networking Lunch Series

Title: Nanotexturization for High Efficiency, Thin Film Photovoltaics

Speaker: Prof. Arturo A. Ayon, Ph.D.
Professor, Department of Physics and Astronomy
Director, MEMS Research Laboratory, UTSA

Venue: BSB 3.03.02 Tom & Nancy Loeffler Seminar Room,
BSB Building, UTSA, San Antonio, TX 78249

Date: Thursday, May 2, 2013

Time: 12.00 – 1.30 PM*

Abstract: Single junction, single crystal silicon (SCS) solar cells, in spite of their relatively high cost (\$5.50 per watt in the San Antonio, Texas market), have captured more than eighty percent of the current solar cell market, because they are considered to be the best choice due to their relatively high efficiency. But cost is the main impediment for solar cells to capture a larger market share. Thus, identifying and demonstrating practical schemes to achieve device efficiencies comparable to SCS while reducing manufacturing costs, is considered the greatest challenge that needs to be overcome. We discuss the investigation and characterization of forward scattering phenomena arising in nanoparticle arrays near their localized plasmon resonance, which by producing a strong field enhancement effect on the substrate leads to higher optical absorption and, therefore, higher efficiencies of operation. Preliminary calculations indicate that the ultimate efficiency of an optimized silicon nanohole (SiNH) array in combination with the surface and bottom-of-a-trench Au nanoparticle arrays proposed herein, can be as high as 39.67% which compares favorably with the calculated efficiency of 31.11% for an optimized silicon nanohole array. Furthermore, the utilization of a silicon nitride antireflective coating is anticipated to increase the efficiency to a promising 41.88% while the utilization of a single-crystal silicon layer of thickness of approximately 2.8 microns will be instrumental in drastically reducing the manufacturing cost.

*Please RSVP to: info@santf.net. Please check our website (www.santf.net) for complete program details and upcoming meeting schedule. Lunch will be provided with prior registration ONLY.

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