

UV Detectors and Imaging Arrays *Dr. Michael Hoenk, Jet Propulsion Laboratory*

May 10, 2017

2475 E Huntington Dr., San Marino, CA 91108



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AGENDA

5:30 pm – Refreshments/Pizza

6:00 pm – Announcements

6:10 pm – Lecture, Dr. Michael Hoenk

7:00 pm – Discussions

7:30 pm – Adjournment

The IEEE Photonics & GRSS chapters special lecture event (Free)

Surface passivation has been a challenge for silicon devices from the beginning, having played a critical role in the development of field-effect transistors and VLSI circuits. Early efforts to develop back-illuminated silicon detectors for ultraviolet astronomy were fraught with surface passivation problems. After discovering a critical problem with detectors in Hubble Space Telescope's Wide-Field Planetary



Camera, researchers at the Jet Propulsion Laboratory (JPL) pioneered several approaches to the passivation of silicon detectors, including the use of molecular beam epitaxy to grow a surface passivation layer on back-illuminated CCDs. Uniquely among all methods previously explored, delta-doped CCDs achieved nearly 100% internal quantum efficiency and exceptional stability. Several challenges remained in development of these detectors for spaceflight. With the recent development of wafer-scale bonding and thinning technologies, and following JPL's acquisition and development of 200mm silicon molecular beam epitaxy equipment and processes, these challenges have now been solved. We are currently fabricating delta-doped and superlattice-doped CCDs and CMOS imaging detectors at full wafer scale, and we are exploring a variety of different silicon detectors, including technologies for imaging x-rays on nanosecond timescales, scintillation detectors for detecting gamma rays with sub-nanosecond resolution, and single photon counting detectors for astronomy and astrophysics.

Dr. Michael Hoenk is a Principal Member of the Technical Staff in JPL's Flight Instrument Detectors & Systems Group. Dr. Hoenk co-invented, developed and demonstrated the first delta-doped CCD, which provided stable surface passivation and nearly 100% internal quantum efficiency. His recent invention and development of superlattice-doped imaging detectors solved an important problem in radiation-induced surface degradation in deep ultraviolet semiconductor metrology systems. He is currently the Lead and Product Development Manager for the OCO-3 Context Cameras, and serves as Focal Planes and Detectors Chair for Team X Instruments studies. Dr. Hoenk is a recipient of several prestigious awards, including JPL's Lew Allen Award of Excellence and NASA's Exceptional Achievement Award.



Directions and Parking: One block west of San Marino High School on the north side of Huntington Drive. Masters Realty Meeting Room. Free street parking.

Reservation: RSVP with your IEEE membership # to dzt_ieee@outlook.com. You are welcomed to bring your spouse as a guest. Nonmembers can go to www.ieee.org/join, then send your membership number with your request.