

Nanotechnology Seminar Series

“JWST Microshutter Array System and Beyond”

July 15, 2011, 9:30-10:30AM
BNC, ROOM 1001

Dr. Mary Li
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Brief Bio: Dr. Li received her Ph.D. degree in Material Science & Engineering from University of Maryland, College Park, in 1992. Leading the group of MEMS- and Nano-Technologies at NASA Goddard Space Flight Center (GSFC), she is specialized in the fabrication, characterization, and packaging of semiconductor-based detectors and MEMS/NanoTech devices/systems. She is a lead engineer in MEMS device fabrication for Microshutter Arrays from concept design to flight-qualified devices for James Webb Space Telescope. Her expertise on materials characterization provides her capabilities in precise materials selection and critical processing procedure verification. Dr. Li, as PI and Co-I, received multiple research and research equipment awards from National Science Foundation, Army Defense-University Research, NASA, University of Maryland and the electronics industries. She received NASA Exceptional Engineering Achievement Medal in 2009 and multiple achievement awards at GSFC. She published more than 60 papers in various technical journals in MEMS device fabrication, microelectronics characterization, materials properties, and two book chapters in microelectronic packaging and reliabilities.

Brief Abstract: We have developed the Microshutter Array (MSA) system at NASA GSFC as a multi-object aperture array for the Near Infrared Spectrograph (NIRSpec) instrument on the James Webb Space Telescope (JWST). The MSA system will enable NIRSpec to simultaneously obtain spectra from more than 100 targets, which, in turn, increases instrument efficiency one-hundred fold. Consequently, this system represents one of the three major innovations on the JWST, which has been selected by the National Research Council's 2001 decadal survey as the top-ranked space-based mission and is scheduled to be the successor to the Hubble Space Telescope. Furthermore, the MSA system will be one of the first MEMS devices serving observation missions in space. Microshutters are designed for the selective transmission of light with high efficiency and contrast and feature torsion hinges, light shields, deep-reactive ion-etched silicon windows, magnetic actuation, and electrostatic latching and addressing. Complete MSA quadrant assemblies consisting of 365 x 181 microshutters have been successfully fabricated.