Diana Huffaker is Professor of Electrical Engineering at the University of California at Los Angeles. She directs the Integrated NanoMaterials Lab User Facility within the California Nanosystems Institute along with the Clean Green program funded through NSF and ARRA. Professor Huffaker has co-authored over 200 refereed journal publications with more than 7300 citations and many invited presentations world-wide. Her research interests include plasmonics, nanostructures, silicon photonics with specific demonstrations in nanowire 3D plasmonic antenna arrays for single-photon detectors, hybrid solar harvesting devices. Fundamental science explores function of scale, strain, interfaces and energy transfer with emphasis on compound III-(As, P, N, Sb) materials along with organic compounds. She is a Fellow of OSA, IEEE and the Humboldt Society along with Photonics Society Distinguished Lecturer. She is an active participant in the technical community with leadership roles in many international societies including IEEE, SPIE, SWE, WISE, MRS, OSA and TMS and involved in local and national community programs.

Title: Patterned III-V Nanopillars: A platform for integrated optoelectronic devices

Abstract: Realizing the integration of nanostructures into useful devices and photonic systems has been a topic in hot pursuit for almost a decade. While many groups demonstrate innovative synthesis techniques and compelling device possibilities, true utility has not yet been realized. Furthermore, the utility of nanoscale physics has not been exploited. In this work, we focus on photolithographically defined nanopillars: the diameter, pitch and mask arrangement can be precisely pre-determined at nanometric resolution. Our approach, which is more compared to catalyzed synthesis, allows exquisite control of material composition and doping thus enabling the possibility of competitive device realization. This presentation includes discussion of nanoscale epitaxy, heterostructure formation, surface state effects and doping issues. Device demonstrations include recordholding hybrid photovoltaics, room-temperature, continuous-wave photonic crystal lasers and plasmonic-enhanced avalanche photodetectors (APD) featuring self-aligned subwavelength metal grating. The APD performance is characterized by nanoscale dimensions to demonstrate THz frequency response with very low noise. Quantum-dot synthesis and device applications will also be discussed along with 2D materials studies to develop silicene epitaxy.