



**Wednesday**  
**October 10, 2018**  
**3:30 pm**  
**Room 1005 EECS**

# Prof. Richard Wirz

University of California-Los Angeles

## Plasma Interactions with Materials, Metamaterials, and Photonic Crystals

Plasma interactions with surfaces can significantly affect the local material and the plasma behavior. This talk will cover two topics: (1) the use of advanced surfaces to reduce plasma-material interactions and (2) the plasma functionalization of metamaterials and photonic crystals. The Plasma Interactions (Pi) facility at UCLA enables testing of plasma-facing surfaces over a wide range of densities, energies, and fluence while providing in-situ observation with a wide range of intrusive and non-intrusive diagnostics. Using this facility and computational models, we have developed and characterized new surfaces that reduce ion induced sputtering and ion-induced secondary electron emission (iSEE) by over 50%. Certain geometries improve trapping of sputterants and electrons for high-energy plasma applications. Similar surfaces provide significant reductions to electron-induced secondary electron emission (eSEE), resulting in materials that are plasma-resilient and minimally invasive. The talk will also cover recent discoveries on plasma-functionalized metamaterials and photonic crystals. We have uncovered coupling modes between “spoof” surface plasmons (SSPs) and plasma-based surface plasmon polaritons (SPPs) that could lead to a new class of devices for EM-manipulating metasurfaces including rapidly tuneable filters, switches, multiplexers, and beam steering.

**About the Speaker:** Richard E. Wirz is an Assoc. Professor in the Mechanical and Aerospace Engineering Dept. at the University of California at Los Angeles and holds a joint appointment at NASA JPL. He is Director of the UCLA Plasma & Space Propulsion Laboratory, where research is focused on the unique partially-ionized plasmas found in space electric propulsion (EP) systems. The lab also develops miniature thrusters and microplasma devices. He is also Director of the UCLA Energy Innovation Laboratory, which investigates renewable energy applications for solar thermal energy storage and advanced blade designs for large scale wind turbines. He has authored over 150 publications, two NASA Tech Briefs, and has several patents. Prof. Wirz is a received the AFOSR Young Investigator Award, and the Northrop Grumman Excellence in Teaching Award. He received a B.S. in Aerospace Engr. and a B.S. in Ocean Engr. from Virginia Tech, and his M.S. and Ph.D. in Aeronautics and Applied Sciences from the California Institute of Technology.