The departments of Chemical Engineering, Chemistry & Biochemistry, and the Partnership for International Research in Electron Chemistry and Catalysis at Interfaces are pleased to announce a

SPECIAL SEMINAR

Tailoring Electrocatalyst Materials at the Nano-Scale: Controlling Activity, Selectivity, and Stability for Energy Conversion Reactions

Prof. Tom Jaramillo

Dept. of Chemical Engineering
Stanford University

Wednesday, March 7th @ 4pm, Engineering II #1519

Chemical transformations are ubiquitous in today's global-scale energy economy. The ability to catalyze chemical reactions efficiently will continue to be critically important as we aim to enable a future energy economy based on renewable, sustainable resources. This talk will focus on our efforts to develop catalytic materials for the low-temperature, electron-driven production and consumption of chemical fuels, reactions that could play key roles for future energy technologies. The reactions we seek to catalyze include: (1) H_2 generation from water and (2) the synthesis of hydrocarbons and alcohols from CO_2, and (3) the oxygen reduction reaction (ORR), reducing O_2 to H_2O. Reactions (1) and (2) are relevant to the synthesis of chemical fuels from renewable resources (e.g. wind and solar), while reaction (3) is a major technical obstacle at the cathode in low-temperature fuel cells. Common catalyst materials for these reactions face challenges in terms of activity, selectivity, stability, and/or cost and earth-abundance. This talk will describe approaches used in our research group to understand the governing principles guiding the reaction chemistry, as well as strategies to tailor the surface chemistry of materials through control of morphology, stoichiometry, and surface structure at the nano- and atomic-scale in order to overcome performance barriers in catalyzing these reactions, particularly for low-cost, earth-abundant materials.