

# Chemistry Colloquium

Wednesday, May 11, 12 pm

140 Hutchison Hall—Zoom Link also Available

## James Mayer

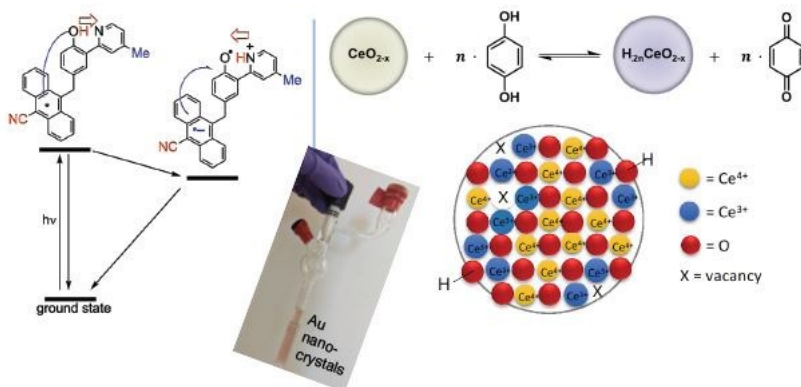
Charlotte Fitch Roberts Professor of Chemistry

Yale University



*“Proton-Coupled Electron Transfer Reactivity of Molecules and Materials”*

**Abstract:** Chemical oxidation and reduction (redox) reactions are typically described as the transfer of electrons, but protons often play an equally important role. Such proton-coupled electron transfer (PCET) reactions are central to many chemical processes, from catalysis in fuel cells to the biological ‘electron’ transport chain. This presentation will begin with fundamental studies of single reaction steps that involve transfer of one proton and one electron. Some of these reactions ‘look like’ transfer of a hydrogen atom, while in other reactions the electron and proton are quite separated in the reactants or products, as in the photochemical example below left. The rate constants for many of these reactions can be understood using a version of Marcus Theory. PCET is also very important at solid/solution interfaces, for instance in thermal and electrochemical catalysis that involve surface hydrogen atoms. Our adventures in this area have started from the thermochemistry and stoichiometry of H binding, and we are starting to connect those insights to reactivity. The materials we have examined include  $\text{TiO}_2$ ,  $\text{CeO}_{2-x}$ ,  $\text{NiO}$ ,  $\text{CoP}$ , and gold. A number of stories involving colloidal nanoparticles and electrode surfaces will provide examples of this reactivity and will show the complexities and opportunities in this area (below, center and right).



**Zoom Meeting:** <https://rochester.zoom.us/j/98157883675>

**Website:** [https://events.rochester.edu/event/chemistry\\_inorganic\\_colloquium\\_mayer](https://events.rochester.edu/event/chemistry_inorganic_colloquium_mayer)

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