

# Seminar

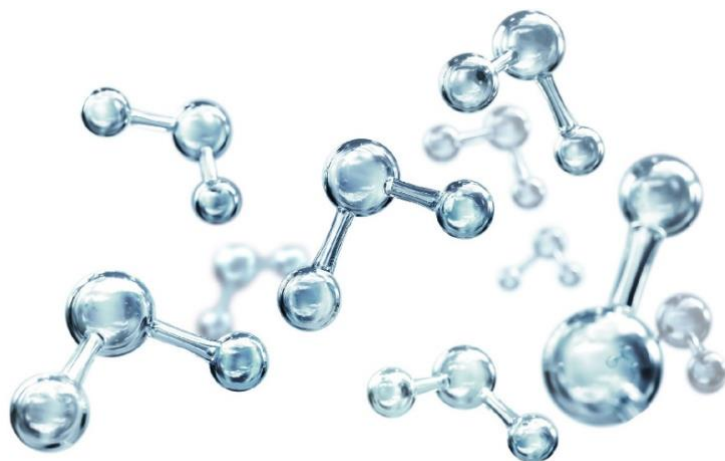
25th of May 2023  
16:00 h

Zoom Virtual Meeting:

<https://tuhh.zoom.us/j/82631283465>

Meeting-ID: 826 3128 3465

Password: 978444



## Francesca M. Toma

*Lawrence Berkeley National Laboratory (California, USA) and Helmholtz Zentrum Hereon (Geesthacht, Germany)*

### Design and characterization of integrated systems for solar fuel production

Carbon neutral energy sources that are scalable, deployable, and cost effective will be required at an unprecedented scale to halt irreversible climate change. To design novel materials that can efficiently produce energy with minimal impact on the environment, few factors are of primary importance: i) complete understanding of the properties of the most selective and efficient reaction environments, and ii) correlative characterization of their behavior under operating conditions. Here, we will focus on the role played by microenvironments and on the opportunities offered by the utilization of sunlight for hydrogen production and CO<sub>2</sub> reduction. We will show the synthesis and the advanced characterization of integrated semiconductors and catalysts for (photo)electrocatalytic systems as they can be used under realistic operating conditions for solar fuel production. We will present recent results from our group supported by theoretical calculations that led to highly selective CO<sub>2</sub> (photo)reduction on Cu, Ag, and Cu<sub>2</sub>O electrodes. In addition, we will discuss how to make more durable materials for light-driven H<sub>2</sub> production.

Bio: Dr. Toma is an expert in materials synthesis and characterization. In her career, she has worked with several classes of materials spanning energy research and nanomedicine. During her postdoctoral research at University of California Santa Barbara first, and Berkeley afterwards, she developed an interest for organic materials for molecular electronics. She has currently a joint position with Lawrence Berkeley National Laboratory (California) and the Helmholtz Zentrum Hereon, where she holds a Distinguished W3 Professorship. At LBNL, she leads the Liquid Sunlight Alliance. At Hereon, she leads an institute focused on functional materials for sustainability. In her career, and more intensively in these past ten years at LBNL, she has been recognized world-wide for her contribution in photo and electrocatalysis. In 2018, she was selected by the Royal Society of Chemistry as one of the “100 Women of Materials Science”. She was awarded the Rising Star Award by ACS in 2021, and named Oppenheimer Fellow by the U.S. National Lab Directors Council in 2022.