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Accelerated discovery of materials for solar fuel cells at JCAP¹
SLOBODAN MITROVIC, EARL CORNELL, JOHN GREGOIRE, JOEL HABER, KEVIN KAN, SEAN LIN, XIAONAO LIU, MARTIN MARCIN, EDWARD SOEDARMADJI, SANTOSH SURAM, CHENGXIANG XIANG, JIAN JIN, Joint Center for Artificial Photosynthesis, California Institute of Technology — High-Throughput Experimentation group at the Joint Center for Artificial Photosynthesis has a formidable mission: provide accelerated discovery of new photon absorbers and heterogeneous (photo)catalysts for solar fuel cells at the rate far beyond anything attempted in material science to date. The HTE pipeline includes material synthesis, screening and characterization. Within the first year of operations, our fabrication capabilities have risen to 100,000 samples per day using combinatorial inkjet-printing. Such high rate of sample production is setting daunting requirements on screening methods. We are developing and testing methods for fast bandgap measurements, using colorimetry and uv-vis spectroscopy. Material thickness and roughness is determined by confocal chromatic spectroscopy. Catalytic activity is screen through a massively parallel bubble screen and a fast scanning droplet (photo)electrochemical cell. Concurrently, we are developing protocols for high-throughput determination of phase and structure (XRD), surface composition and chemistry (XPS), surface area measurement, etc. on the characterization side of the pipeline.

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Slobodan Mitrovic
Joint Center for Artificial Photosynthesis, California Institute of Technology

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