

Abstract Submitted  
for the OSF16 Meeting of  
The American Physical Society

**Photocatalytic Reductions using p-GaP Photoelectrode and NAD<sup>+</sup>/NADH Analogs** STEFAN ILIC, USHA PANDEY, GEORGE HARGENRADER, KSENIJA GLUSAC, Bowling Green State University — This project investigates photocatalytic reduction of protons using NAD<sup>+</sup>/NADH analogs attached to the surface of appropriate photocathode (p-GaP). The NAD<sup>+</sup> analogs are first photo-chemically reduced to NADH analogs, then the hydride transfer from NADH analogs to protons leads to the H<sub>2</sub> evolution. The light harvesting is achieved by NAD<sup>+</sup> analogs (red photons) and by p-GaP (blue photons). Our initial study of the photoreduction step involved six NAD<sup>+</sup> analog dyes, only two of which showed successful photosensitization of GaP. Subsequent femtosecond pump-probe measurements indicated that the two successful dyes are the ones with sufficiently long excited-state lifetimes (>600 ps). The hydricities of model NADH analogs were evaluated using computational and experimental methods, and the results showed that most of the NADH analogs are excellent hydride donors. However, the proton reduction using NADH analogs occurred only in the presence of Pd as a catalyst. The results indicated that NADH analogs exhibit high thermodynamic hydricities, but sluggish hydride transfer kinetics.

Stefan Ilic  
Bowling Green State University

Date submitted: 12 Sep 2016

Electronic form version 1.4