

Abstract Submitted
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Photochemistry with Diamond¹ JONATHON BARKL, ANNA ZANIEWSKI, ROBERT NEMANICH, Arizona State University — In this project, we are exploring thin films of diamond on various substrates for photochemistry through electron emission induced by light in the visible spectrum. Diamond is unique as a semiconductor due to its large 5.5 eV band gap, and can have a negative electron affinity, meaning the conduction band edge is at a higher energy than the vacuum. This property allows the electrons emitted through photoemission to be used as an energy “reservoir” for energy intensive reduction reactions, such as the reduction of nitrogen gas to ammonia. This project explores the properties of the diamond films, substrates, and experimental setups in order to determine if photoemission and chemistry are possible with diamond in the visible light spectrum, with lower photon energies than previously demonstrated. This will require the lowering of the effective work function, the energy required to excite electrons from the valence band to the conduction band. The first phase of this project will be to recreate previous experimental results achieved using ultraviolet light on diamond films on molybdenum substrates. In the second phase, we will study the physical properties of the diamond films, various substrates, and other properties in order to achieve the necessary low effective work function.

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