# A Study on Electrocatalytic Nanoelectrode Using Local Electrochemistry

Keegan Nitsch\*, Jay Min Lim, Ravi Saraf University of Nebraska-Lincoln Department of Chemical and Biomolecular Engineering, \*NCESR Intern

### **Photo-splitting of water: Energy Injection Challenge**



• Light excites electrons to higher energy states, and the energy from that higher energy level can be captured as it returns to the ground state (hole).



• Semiconductors used to capture light energy (TiO<sub>2</sub>) absorb light in the ultraviolet (UV) region. This is only 2% of the solar spectrum.



• Localized surface plasmon resonance of Au nanoparticle necklaces absorbs over 50% of total solar radiation







nanoparticles links the nanoparticles together



hydrogen evolution reaction (HER).



• 100 mM NaOH (top) and 1M NaClO4 (bottom).

### Catalysis on N<sup>3</sup>



This work was supported by the Nebraska Public Power District through the Nebraska Center for Energy Sciences Research at the University of Nebraska-Lincoln.



## **NEBRASKA CENTER** FOR ENERGY SCIENCES RESEARCH

