ND*nano* Undergraduate Research Fellowship (NURF)
2011 Project Summary

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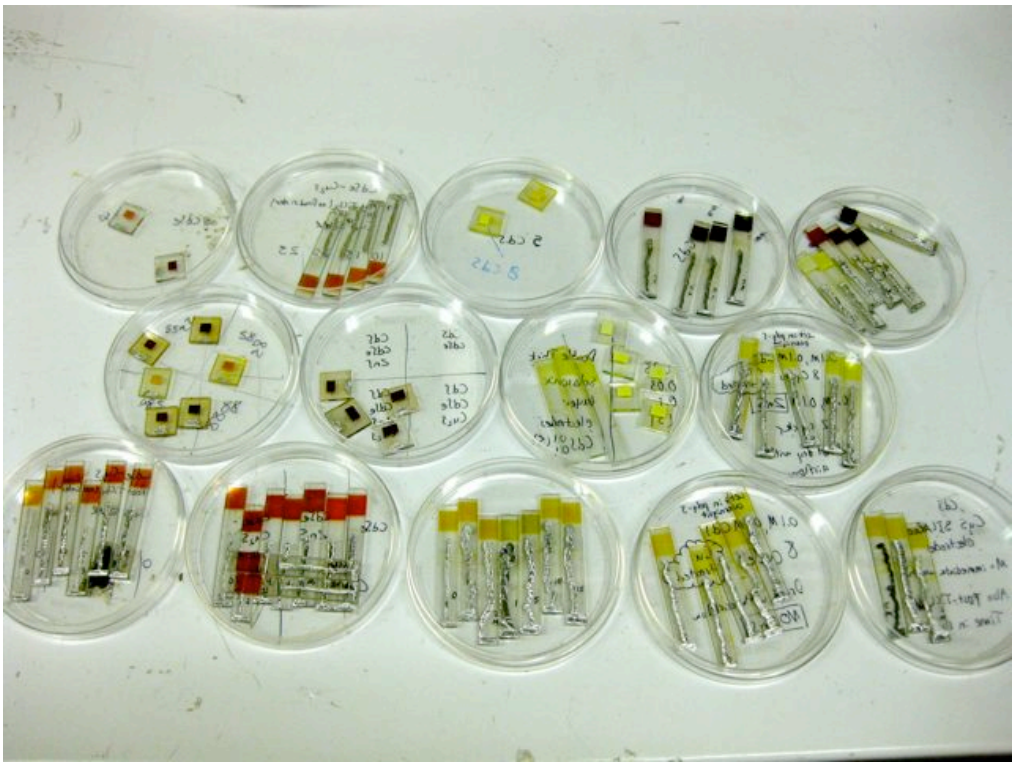
Project title: The Effect of Cu2S on Solar Cell Performance

Great strides have been undertaken by modern scientists to improve the efficiencies and power outputs of solar cells for the alternative energy industry. High efficiencies in solar cells are hard to achieve, as there are many factors that diminish their performance. The solar cells used involve TiO_2 films on fluorine tin oxide conductive glass. CdS and CdSe are added to the TiO_2 films in layers to increase electron excitation and ejection at the surface, inducing a voltage and current. These solar cells typically have efficiencies less than 4% and fill factors less than 50%.

My research this summer aimed to improve the efficiencies and fill factors of these TiO_2 solar cells. To do this, I tried adding a layer of copper sulfide on the excitation site. Copper sulfide is an excellent semiconductor that allows for better charge separation and stabilization on the electrode. With electrons better separated from the material on the electrode surface, the efficiency of the solar cell should improve, as well as the power output. My goal was to determine if copper sulfide improves solar cell performance, and how to best get it on the cells. There was some indication that copper sulfide improves performance, however the results were inconclusive and need further investigation. I found that the best way to deposit the copper sulfide, however, was by a Cu_2S SILAR dipping method.



Solar cells: FTO glass electrodes with TiO_2 and CdS/CdSe/ZnS/Cu_2S layers