Electrified Bubbles

Smith, Davonna (School: Early Light Academy)

With renewed interest in green fuel technology or E-fuels as an alternative to fossil fuels, interest has returned to hydrogen production and improving the electrolysis process. The key issue is how to lower the amount of energy or power to convert Water (H2O) into Hydrogen (H2) and Oxygen (O2). A paper by the M.I.T. professor Dr. Daniel G. Nocera, showed plating Nickel with a Cobalt–Phosphate catalyst could lower the amount of voltage to break Oxygen bonds in water during electrolysis. The new catalyst used earth-abundant materials of Nickel, Cobalt, and Phosphorus, instead of relying on rare earth metals like Platinum. Additional research at Rice University showed using UV light as a catalyst reduced power consumption. My research incorporates these findings to investigate if test time and power could be further reduced and increase H2 and O2 generation if Stainless-Steel was used. The experiment would hold current constant and surface area would scale to see the effects on gas production. To measure gas volume production, I designed an Electrolysis Test Container Assembly (ETCA) attached to a 500 ml Plastic Syringe. As Dr. Daniel G. Nocera states, if solar power were to convert water into H2 and O2, it would be like a plant converting sunlight and water into breathable Oxygen. The best part would be that the chemical energy could be stored for later use by converting it back to electrical or mechanical energy through the use of Hydrogen fuel cells and only carbon-free water vapor would be produced.

Awards Won: