Calorimetry for Low Energy Nuclear Reactions (LENRs) in Hydrogen Pressurized Nanoparticles

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This is a continuation of earlier work on LENR in metal hydrides.[1] We hypothesize that, through particular material processing, we can create a metal oxide framework capable of being super saturated with hydrogen during a reduction reaction and producing LENR. The central conceit is that hydrogen can be packed into defects in the crystal lattice of a metal hydride, and that as these absorbed hydrogen atoms become more crowded and energetic, they will be more likely to cross the Coulomb barrier in a fusion reaction.

Our goal in these experiments was to make crossing the Coulomb barrier as likely as possible, which necessitated maximizing crystal defects in the metal hydride, maximizing the hydrogen packed into each defect, and maximizing the temperature of the packed hydrogen. After fabricating a defect-rich metal oxide material, we heated the material and exposed it to pressurized deuterium, causing a reduction reaction, and hopefully a fusion reaction. To measure the energy release from possible nuclear reactions, we employed a convenient calorimetry which tracked input heat and the temperature rise of the metal hydride. Results were benchmarked against equivalent experiments that employed a non-reacting gas in place of deuterium. After accounting for the input heat and the other heat sources, excess heat would represent heat due to LENR. While our results showed promise, these measurements encountered problems which made results difficult to interoperate. They Involved evaluation of excess heat by converting the change in temperature of the metal hydride to energy as determined from prior calibration of this relationship. This represented an output energy from which we subtracted input heat, heat due to reduction, and Joule-Thompson heat. These measurements for output heat remained questionable because of difficulty in finding exact temperature equilibria, preventing a trustworthy value of excess heat. We then performed an analysis of variance and covariance to see when we measured a greater equilibrium temperature to input heat ratio. Results were still statistically inconclusive. To overcome these problems, we are currently using added excitation methods to create larger temperature differences and longer equilibria times. These experiments and initial results will be presented along with a review of the prior studies.

[1] G. Miley, IH UIUC Lab LENR Team, "Study of a Power Source Based on Low Energy Nuclear Reactions (LENRs) Using Hydrogen Pressurized Nanoparticles," Tech Connect Conference, Washington, DC, Vol. 2, Tech Connect Briefs, 2017.