

OXYGEN REDUCTION REACTION (ORR) OF PALLADIUM NANODENDRITES FOR PROTON EXCHANGE MEMBRANE FUEL-CELLS (PEM FCs)

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Pd continues to be a material of interest for PEM FC applications. At approximately a third of the price of Pt, Pd presents a potentially viable and economically feasible alternative. In our lab, an intersection of the two prominent criteria for improved catalytic activity prompted the synthesis and electrocatalytic study of morphologically controlled Pd NPs including nanodendrites. Morphology control was achieved through a colloid synthesis involving a Pd precursor (K_2PdCl_4), a surfactant (cetyltrimethylammonium bromide) and reductant (Ascorbic Acid) in a sequential reagent addition synthesis.

In studying the variation in ORR activity of Pd NPs as a function of shape, we will present a comparison of ORR curves for the various shapes of materials synthesized. Thus far, results indicate a favorable trend towards the improved catalytic activity of PEM FCs with Pd nanodendrites. The significance of this finding lies in the potential to provide a cheaper and alternative catalyst material to the current Pt standard for PEM FCs. ORR results will be complimented with electrochemical surface area, (ECSA) and electron microscopy images of the synthesized materials and the role of particle morphology on the electro catalytic process will be discussed.