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Optimization of Pt/C Catalyst Nanofibers Electrospun on Nafion 117 Membranes in Polyelectrolyte Membrane Fuel Cells[1] SURYA RAJAN, California High School, EDWARD OKEEFE, Ridgewood High School, DAVID LEDERER, Hebrew Academy of the Five Towns and Rockaway, ANIKET RAUT, LIKUN WANG, MIRIAM RAFAILOVICH, Stony Brook University — While electrospinning the Pt/C catalyst in Polyelectrolyte Membrane Fuel Cells as a part of an electrode composite has previously been used to increase proton conductivity, finely tuning the deposition and composition of the nanofiber structures has hitherto not been explored in great detail. Optical Microscopy, Laser Microscopy, 3D Laser Microscopy, and Scanning Electron Microscopy (SEM) revealed that flow rate and Pt/C weight percentage are positively correlated with platinum agglomeration and nanofiber diameter. The relative peak power density achieved by the 32.5% wt. Pt/C nanofibers indicated an optimal fiber diameter of approximately 1.25 micrometers. At all Pt/C weight percentages, the 0.5 mL/hr nanofiber-coated membranes performed better than or equal to the 1.0 mL/hr nanofiber-coated membranes in terms of power density, supporting the agglomeration reduction theory derived from SEM images. Since the power density tests were on the order of 1% of results achieved in other labs, there is no convincing evidence that the power density increase of 62.5% will exactly match the observed increase in other labs. Thus, the main feature of this research lies in the optimization of the electrospun Pt/C nanofiber structure characteristics.

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