

Recent Progress on the Development of Pt-free Cathode Catalysts for Polymer Electrolyte Fuel Cells

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Polymer electrolyte fuel cells (PEFCs) have received a great deal of attention in terms of applications in transportation, portable devices and combined heat and power systems based on their high energy conversion efficiency and scalability. One major problem for PEFCs in commercial applications is the cost and scarcity of platinum, which is used as the cathode catalyst for oxygen reduction reaction (ORR). It is extremely important to develop precious-metal-free cathode catalysts. This presentation describes synthesis of precious metal free fuel cell catalysts from two series of polymer-based precursors: phenolic resin with Fe phthalocyanine (FePc/PhRs composite) and polyimides with Fe acetylacetonato. Our catalyst materials are prepared by pyrolyzing these mixtures rather than metal complexes loaded onto a carbon support surface. This approach could result in high density of active sites and high durability of the resulting catalysts, since the chemical structure of the active sites can be produced both in the bulk and on the surface of the carbon.

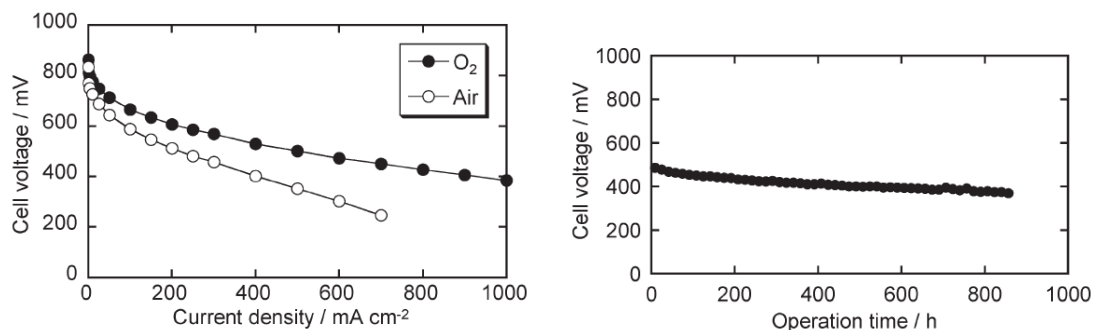


Fig. I-V polarization curves and the result of a durability test with a FePc/PhRs derived catalyst.