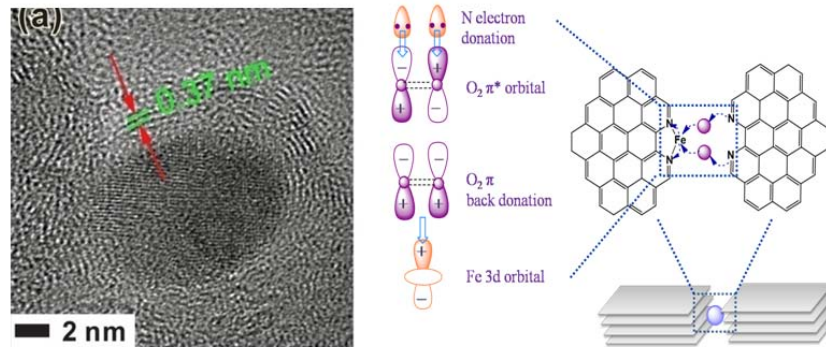


# Development of Low-Pt-Loading Catalysts For Oxygen Reduction Reaction (ORR)

Polymer electrolyte membrane fuel cell (PEMFC) is a very promising energy conversion device with high efficiency, high scalability and low carbon emission. Platinum supported on carbon is the only viable catalyst for PEMFC up to date. But the high cost of platinum has slowed down the wide-spread applications of PEMFC. Thus, the development of low loading Pt catalysts or low cost non-noble-metal catalysts is highly desirable, especially at the cathode, where the oxygen reduction reaction (ORR) requires much higher Pt loading as compared to the anode. Various ORR catalysts have been studied at ICES, including functionalized-carbon-supported Pt, vertically-aligned-CNT-supported Pt, graphene-supported Pt, carbon-supported WC-Pt, MWNT-supported non-noble metals, and N-doped-graphene-supported FeCoN catalysts. Many of them showed high performance with much lower Pt loading than commercially available Pt catalysts. The reaction mechanism and the nature of active center on these catalysts have also been explored.



Active center for ORR over a carbon-coated FeCoN catalyst

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