

Effect of type and amount of metal seed on growth and electro-oxygen reduction reactivity of N-doped carbon for PEMFCs

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N-doped carbon, an alternative to Pt/C catalyst for the oxygen reduction reaction in polymer electrolyte membrane fuel cell (PEMFCs), has been highlighted due to its low price and high activity. However, the roles of seed metals for carbonization of the precursor have not yet been elucidated. N-doped carbons from various metal chlorides ($\text{MeCl}_2 \cdot x\text{H}_2\text{O}$, Me = Co, Fe and Ni) were synthesized and characterized to clarify the effects of metal type on electrochemical and physical properties of the catalysts. The prepared catalysts exhibited various yields, morphologies, onset potentials, and limiting current density according to the type of seed metal. In addition, influence of the amount of metal precursor was also examined. The optimized catalyst showed 0.55 V (vs Ag/AgCl) onset potential and 48% ORRs activity compared to commercial Pt/C (40 wt%, Johnson Matthey).