

Nitrogen doped carbon encapsulation structure incorporating metals for oxygen reduction reaction

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Recently, Zelenay et al. reported that the oxygen reduction reaction (ORR) activity of polyaniline-Fe carbon composite (PANI-Fe-C) is similar to that of Pt. Dodelet et al. insisted that the enhanced activity is based on the effect of 3d-metals [2].

Our previous work [3] elucidated the behavior of 3d-transition metals such as Ni, Co, and Cu in the systems of N-doped graphene on metal supports (N-Gr/M) using first principles density functional theory (DFT). Simply speaking, the metals are able to change the electronic structure of N-Gr, and it plays a role of the positive effect for ORR reaction.

Metal encapsulated at carbon shells (M@N-Cshells) based on theoretical study can be anticipated as a promising catalytic structure. In particular, nitrogen doped carbon is considered as the active sites of ORR catalysts. Hence, in this work [4], we synthesized FeCo@N-C nanoparticle and analyzed this material electrochemically and structurally in the view points of 1) Nitrogen doping effect, 2) carbon thickness effect and 3) alloying effect.

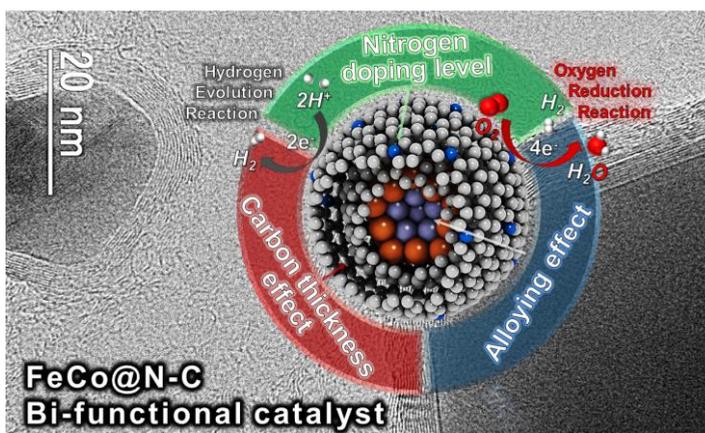


Fig. 1. Schematic illustration of the factors to control the catalytic activity for carbon coated metals

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