Development of highly active and stable Pd7Co2Ni1/C catalyst via heat treatment

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Fuel cell have been recognized as the most promising energy converting devices in terms of low or zero emissions and high efficiency. At the current technical stage, the practical catalysts in fuel cells are highly dispersed platinum Pt-based nanoparticle. However, there are several drawbacks to Pt based catalysts, such as high cost, limited abundance of Pt, and the inherent slower kinetics of ORR. Pt and Pd have very similar properties (same group of the periodic table, same fcc crystal structure and similar atomic size). The cost of palladium, however, is lower than that of platinum, so it could be a good substitute for Pt as a catalyst for fuel cells. For these reasons, Pd has been tested in fuel cells as a catalyst.
Regarding ORR catalyst synthesis, heat treatment has been recognized as an important and sometimes necessary step for catalytic activity improvement. The effect of heat treatment on catalyst properties is significant in terms of catalyst activity improvement. In this study, Pd7Co2Ni1/C catalysts were synthesized by conventional impregnation method. In order to improve activity and stability, the catalysts were heat-treated at various temperatures under reductive atmosphere .