

**Advanced Catalytic Nanoarchitectures
for Anode in Direct Methanol Fuel Cells**

직접메탄올 연료전지의 연료극을 위한 고성능 나노구조 촉매

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Direct methanol fuel cells (DMFCs) are expected to become the heart of power sources for automobiles and portable applications because of their high power density and simple system structure. However, the use of Pt as the anode catalyst in a DMFC has the inherent problem that a byproduct of methanol oxidation, CO, adsorbs onto Pt sites, poisoning the catalyst and reducing the performance of the fuel cell.

In this work, a Pt nanostructured electrode for use in highly catalytic reaction was fabricated by means of a co-sputtering system. The Pt nanoparticles embedded in oxides matrix (WO_3 , TaO_2 , TiO_2) showed an enhanced performance, compared with that of a pure Pt electrode without an oxide matrix. In addition, we found that the excellent activity of the Pt nanostructured electrode was responsible for the role of the oxide matrix, such as the hydrogen spill-over effect.

In order to evaluate the performance of the electrodes, methanol electrooxidation tests were performed using an Autolab PGSTAT30 Potentiostat/Galvanostat. Pt wire and Ag/AgCl (sat. KCl) were used as the counter and reference electrodes, respectively. The sputtered Pt nanostructured electrode was characterized by FE-SEM, HR-TEM and XRD.