

### TiN Nanoparticles Supported on CNT and Graphene Composite for Oxygen Reduction Reaction

윤덕현, 배강홍, 한승훈, 이재성\*  
포항공과대학교  
(jlee@postech.ac.kr\*)

Recently, early transition metal nitrides, oxynitrides, and carbonitrides have been used as oxygen reduction reaction (ORR) catalysts. Here, five different transition metal nitrides (Mo<sub>2</sub>N, W<sub>2</sub>N, Ta<sub>3</sub>N<sub>5</sub>, NbN, TiN) were prepared by simple urea glass route, then compared their physical and electrochemical properties using XRD, SEM, TEM, and half cell test (cyclic voltammetry and linear sweep voltammetry). In half cell tests, TiN showed good electrochemical activity and stability in the potential range of ORR compared to the others. In addition, further modification of TiN with carbon-based materials (CNT, graphene, composite of CNT and graphene) exhibited positive shift of onset potential for ORR (ca. 0.2V) and higher current density than unsupported TiN due to increased electrical conductivity. Especially, TiN nanoparticles supported on CNT and graphene composite showed the best current density for ORR over the whole potential region among supported TiN catalysts, which resulted from increased surface area in CNT and graphene composite.