Design of counter electrode through dry plasma reduction for highly efficient QDSCs

다오반, 최호석†
충남대학교
(hchoi@cnu.ac.kr†)

We developed novel experimental approach for co-reduction of metal (Au, Pt, mixture of Au and Pt) precursor ions and graphene oxide through dry plasma reduction at near room temperature under atmospheric pressure. The nanoparticles (NPs) with an average size of ~ 2 nm were stably and uniformly hybridized on the surface of reduced graphene nanoplatelets (RGC) after co-reduction of metal precursor ions and graphene nanoplatelets (GC) to metal atoms and RGC, respectively. QDSCs exploiting the AuNP/RGC, PtNP/RGC and bimetallic AuPtNP/RGC CEs yield the efficiencies of 2.7, 3.0 and 4.5%, respectively. The efficiencies are comparable to that of device with a conventional Au-sputtered CE (3.6%). Based on EIS, we concluded that both high electrical conductivity and electro-catalytic activity of nano-hybrid bimetallic AuPtNP/RGC CEs are the primary factors, which impact the increase of Jsc, FF, and Voc