Electrochemical characteristics of various Au/Pt bimetallic nanoparticles synthesized from precursor solutions with different ratios of Au and Pt

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we synthesized gold-platinum (Au-Pt) bimetallic nanoparticles (BNPs) on the transparent conducting oxide (TCO) electrode by using dry plasma reduction (DPR). DPR is an excellent approach for easily, continuously, uniformly and stably hybridizing metal nanoparticles on various substrates under atmospheric pressure without any toxic chemicals and at a low temperature. In this study, we first synthesized various Au-Pt BNPs prepared with different ratios of Au and Pt precursors and systematically characterized their electrochemical catalytic activities in order to improve the photovoltaic efficiency of the DSCs. We used SEM, TEM, and XPS for analyzing the morphology and the chemical characteristics of various Au-Pt BNPs. Many small and uniform Au-Pt BNPs were formed at the Au and Pt precursor molar ratio of EIS, Tafel and IV analyses were also conducted to compare the electrochemical characteristics of various Au-Pt BNPs. The Au-Pt BNP synthesized from Au and Pt precursors with the ratio of 5 to 5 showed the most excellent electrochemical catalytic activity.