Synthesis of Graphene-PtCo alloy nanohybrid materials as a low-cost counter electrode material for highly efficient dye-sensitized solar cells

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In this study, we first report the one-pot synthesis of a PtCo alloy/reduce graphene oxide (RGO) nanohybrid materials and their application as a CE in DSCs. Bimetallic PtCo nanoparticles with average size of ~ 8 nm were uniformly immobilized on the surface of RGO with the simultaneous co-reduction of precursors ions and graphene oxide to bimetallic atoms and RGO, respectively, through dry plasma reduction under an atmospheric pressure and near room temperature without using any reductants. The resulting nanohybrid with very small amount of metals exhibits low charge-transfer resistance, low diffusion impedance and high conductivity. The application of developed material as an alternative CE for DSCs leads to high energy conversion efficiency which is comparable to the DSC with the state-of-the-art CE.