Semiconducting Polydopamine for Solar Water Oxidation

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We report herein the fabrication of organic/inorganic hybrid photoanode for solar water oxidation by using semiconducting polydopamine (SC-PDA). P-type SC-PDA can be readily deposited on various photoanodes by oxidative electropolymerization, resulting in the formation of the organic/inorganic hybrid p-n heterojunction photoanode. The resulting hybrid photoanode exhibited excellent photocatalytic performance for water oxidation due to (1) the increased light absorption by the deposition of SC-PDA with a much higher extinction coefficient than inorganic materials, (2) more efficient charge separation by the formation of a p-n heterojunction, and (3) improved catalytic charge transfer by the catalyst-loading effect. More importantly, our approach was found to be applicable to various inorganic semiconductors, such as TiO_2, Fe_2O_3, and $BiVO_4$. We believe that this study can provide inspiration for the design and fabrication of novel organic/inorganic hybrid devices.