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Insight into the effects of modifying chromophores on the performance of quinoline-based dye-sensitized solar cells

Mao Mao ^{a,*}, Jian-Bo Wang ^b, Xiu-Lin Liu ^b, Guo-Hua Wu ^c, Xia-Qin Fang ^d, Qin-Hua Song ^{b,*}

^a School of Atmospheric Physics, Nanjing University of Information Science & Technology, Nanjing 210044, PR China

^b Department of Chemistry, University of Science and Technology of China, Hefei 230026, PR China

^c College of Science and Technology, Nihon University, 1-18-14 Kanda Surugadai, Chiyodaku, Tokyo 101-8308, Japan

^d Key Laboratory of Novel Thin Film Solar Cells, Institute of Plasma Physics, Chinese Academy of Sciences, Hefei 230031, PR China

Abstract

A series of organic dyes based on quinoline as an electron-deficient π -linker, were designed and synthesized for dye sensitized solar cells (DSSC) application. These push-pull conjugated dyes, sharing same anchoring group with distinctive electron-rich donating groups such as *N,N*-diethyl (**DEA-Q**), 3,6-dimethoxy carbazole (**CBZ-Q**), bis(4-butoxyphenyl)amine (**BPA-Q**), were synthesized by Riley oxidation of $-\text{CH}_3$ followed by Knoevenagel condensation of the corresponding aldehyde precursors **2a-c** with cyanocrylic acid. The optical, electrochemical, theoretical calculation and photovoltaic properties with these three dyes were systematically investigated. Compared to **DEA-Q** and **CBZ-Q**, **BPA-Q** possesses better light harvesting properties with regard to extended conjugate length, red-shifted intramolecular charge transfer band absorption and broaden light-responsive IPCE spectrum,

* Corresponding authors. Fax: +86-551-63601592

E-mail address: mmao@nuist.edu.cn (M. Mao), qhsong@ustc.edu.cn (Q. Song)

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