Electronic Supplementary Information (ESI)

Biindoles-based double D-π-A branched organic dyes for efficient dye-sensitized solar cells

Xing Qian, Huan-Huan Gao, Yi-Zhou Zhu,* Lin Lu and Jian-Yu Zheng*

State Key Laboratory and Institute of Elemento-Organic Chemistry, Collaborative Innovation

Center of Chemical Science and Engineering (Tianjin), Nankai University, Tianjin 300071, China;

Fax: +86-22-2350 5572; Tel: +86-22-2350 5572;

*E-mail: zhuyizhou@nankai.edu.cn; jyzheng@nankai.edu.cn.



Fig. S1 ¹H NMR of compound **2** in acetone- d_6 .



Fig. S2 ¹³C NMR of compound 2 in acetone- d_6 .





Fig. S3 ¹H NMR of compound 3 in CDCl₃.





Fig. S4 ¹³C NMR of compound 3 in CDCl₃.









Fig. S6 13 C NMR of compound 4a in CDCl₃.











Fig. S8¹³C NMR of compound **4b** in CDCl₃.



Fig. S9 ¹H NMR of compound **4c** in CDCl₃.



210 200 190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 -10 f1 (ppm)

Fig. S10 ¹³C NMR of compound 4c in CDCl₃.



Fig. S11 ¹H NMR of compound JY11 in DMSO-d6.



Fig. S12 ¹³C NMR of compound JY11 in DMSO-*d*6.

$C_{B}H_{17}O \leftarrow C_{B}H_{17} + C_{O}OOH$



Fig. S13 ¹H NMR of compound JY12 in DMSO-d6.



Fig. S14 ¹³C NMR of compound JY12 in DMSO-d6.







Fig. S16¹³C NMR of compound JY13 in DMSO-d6.