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► **To cite this version:**

Dmitry Aldakov, Muhammad T. Sajjad, Valentina Ivanova, Ashu K. Bansal, Jinhyung Park, et al.. Mercaptophosphonic acids as efficient linkers in quantum dot sensitized solar cells. *Journal of Materials Chemistry A*, 2015, 3 (37), pp.19050-19060. 10.1039/c5ta04021c . cea-01570116

**HAL Id: cea-01570116**

**<https://cea.hal.science/cea-01570116v1>**

Submitted on 18 Oct 2024

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Supporting information for

# Mercaptophosphonic acids as efficient linkers in quantum dot sensitized solar cells

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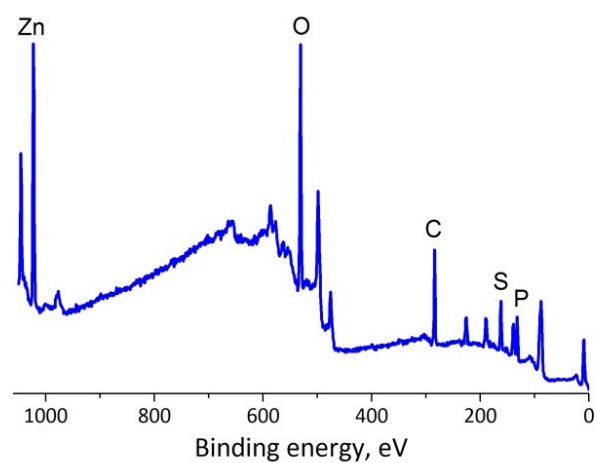
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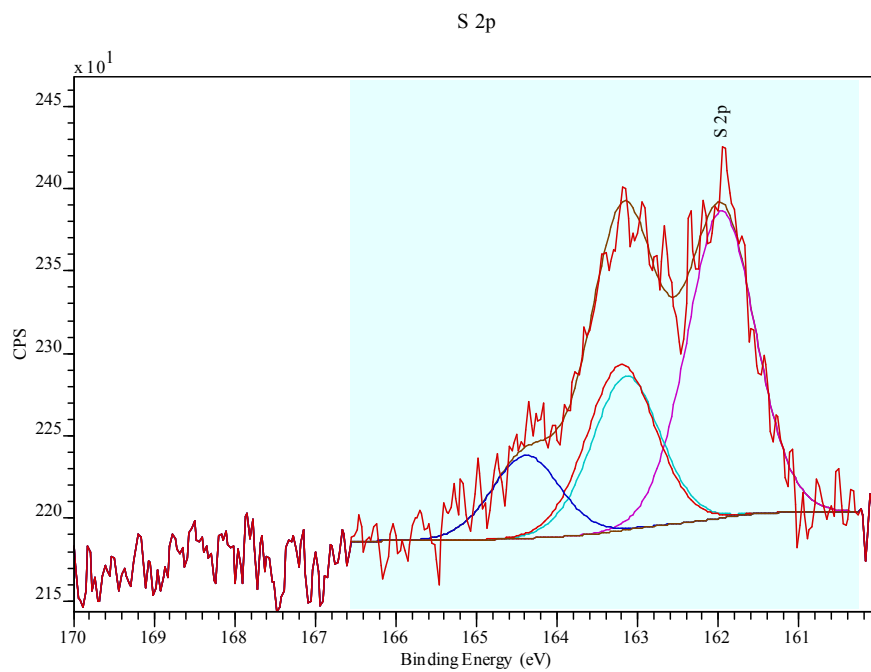
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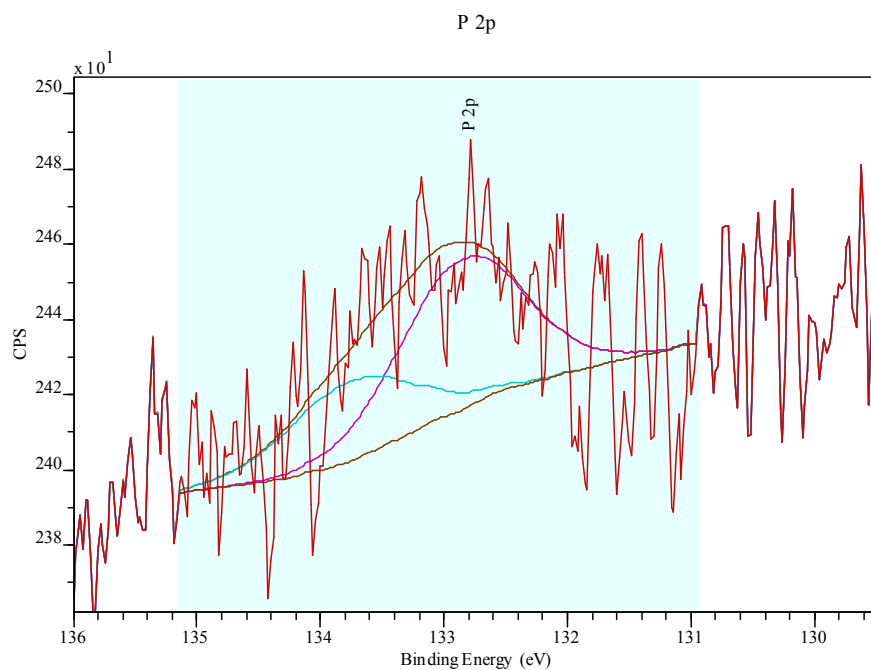
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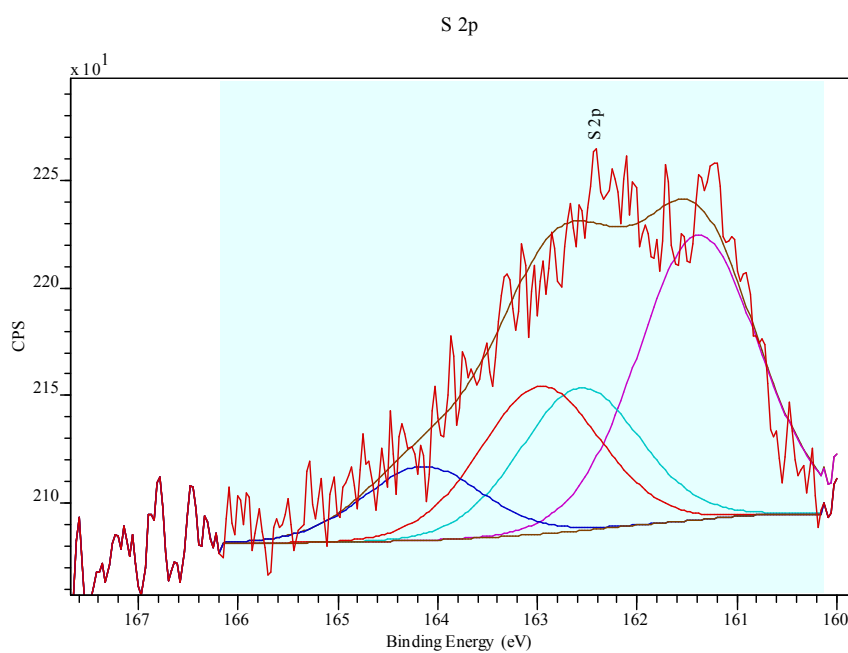
**Figure S1.** XP survey spectrum of ZnO/MEPA assembly



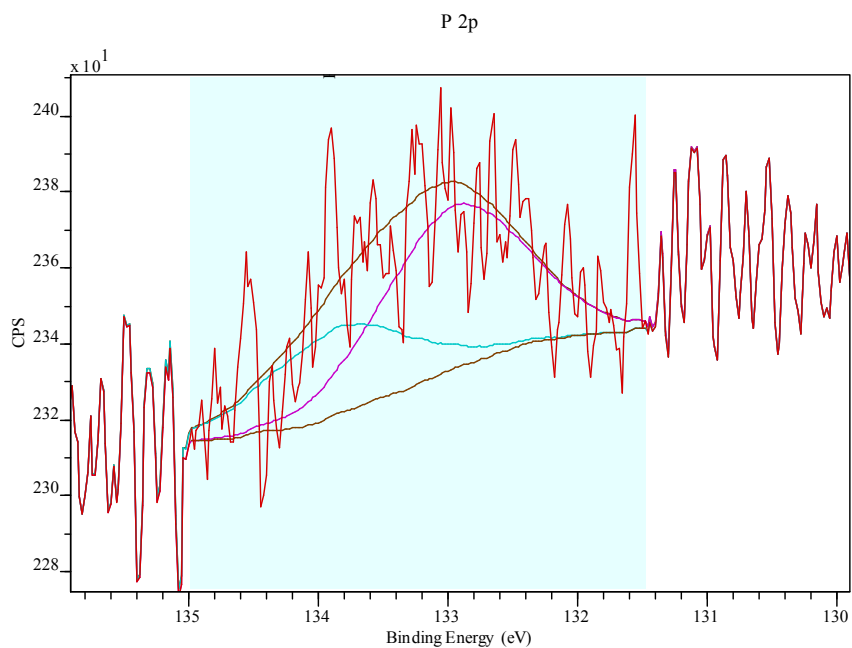
**Figure S2.** High resolution XP spectrum of S 2p region of MEPA assembled on gold.



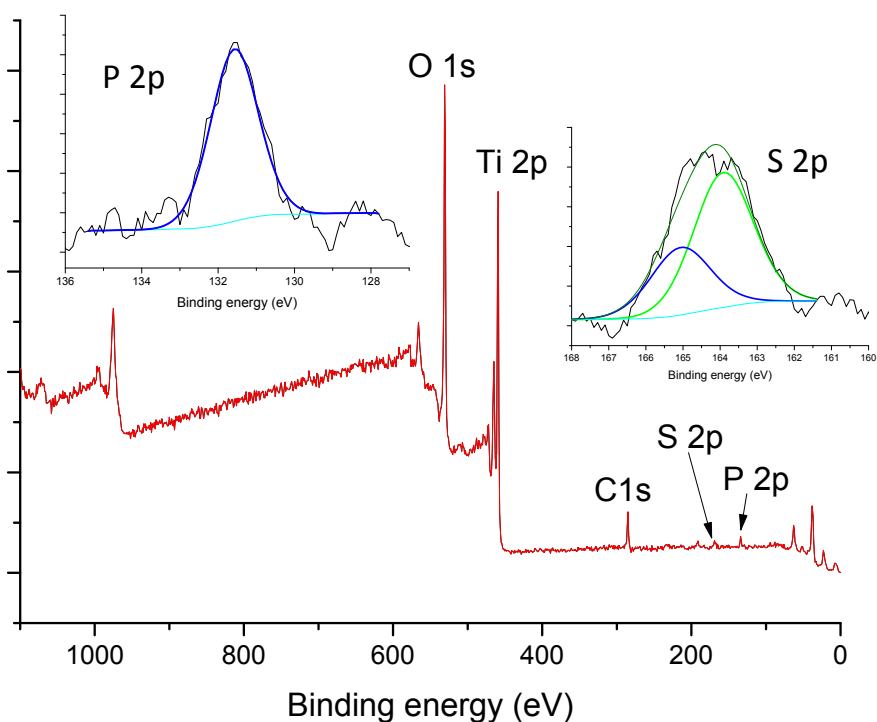
**Figure S3.** High resolution XP spectrum of P 2p region of MEPA assembled on gold.



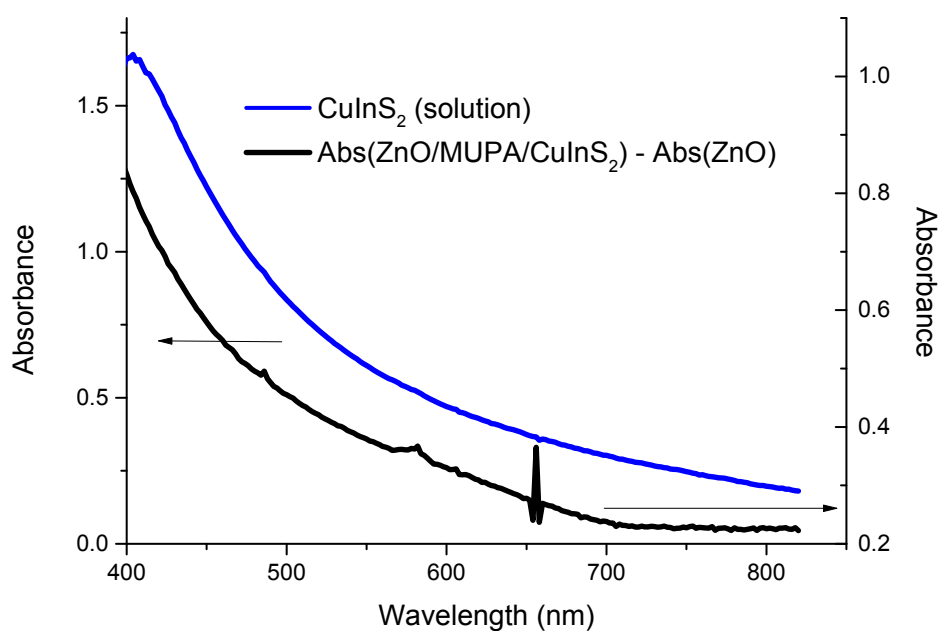
**Figure S4.** High resolution XP spectrum of S 2p region of MUPA assembled on gold.



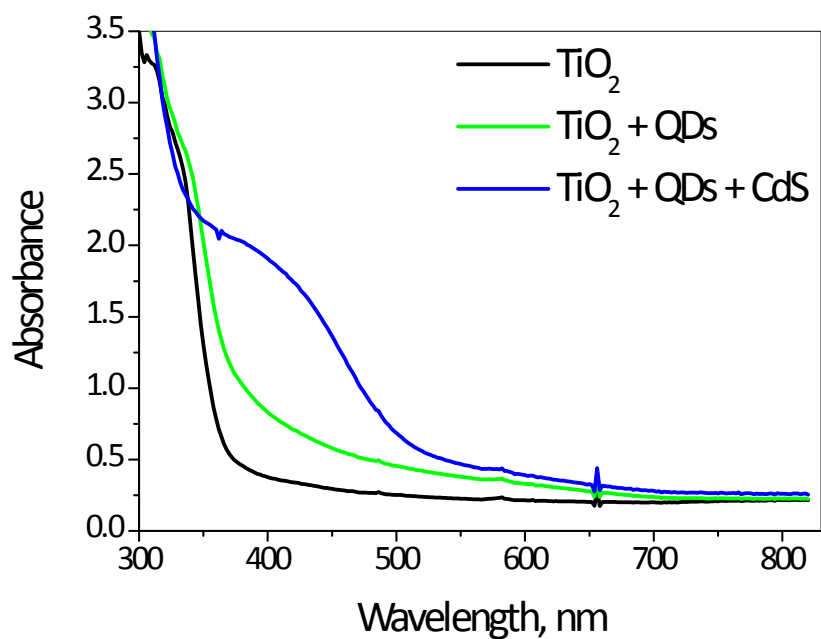
**Figure S5.** High resolution XPS spectrum of P 2p region of MUPA assembled on gold.



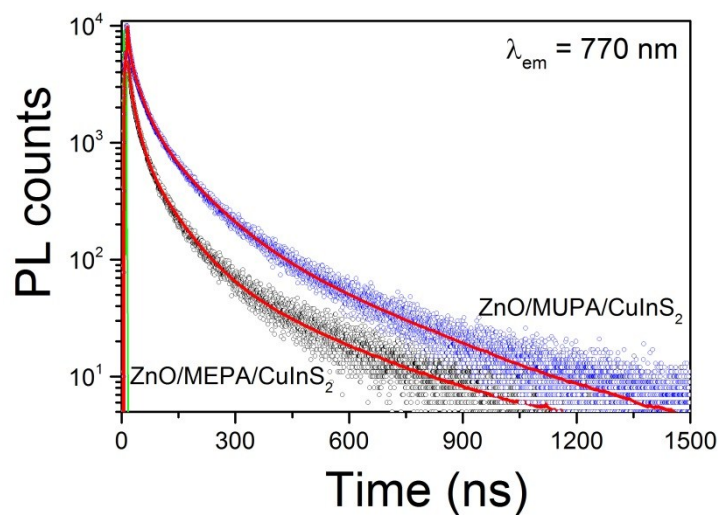
**Figure S6.** Survey XPS spectrum of  $\text{TiO}_2/\text{MEPA}$  and high resolution regions of P 2p and S 2p (insets).



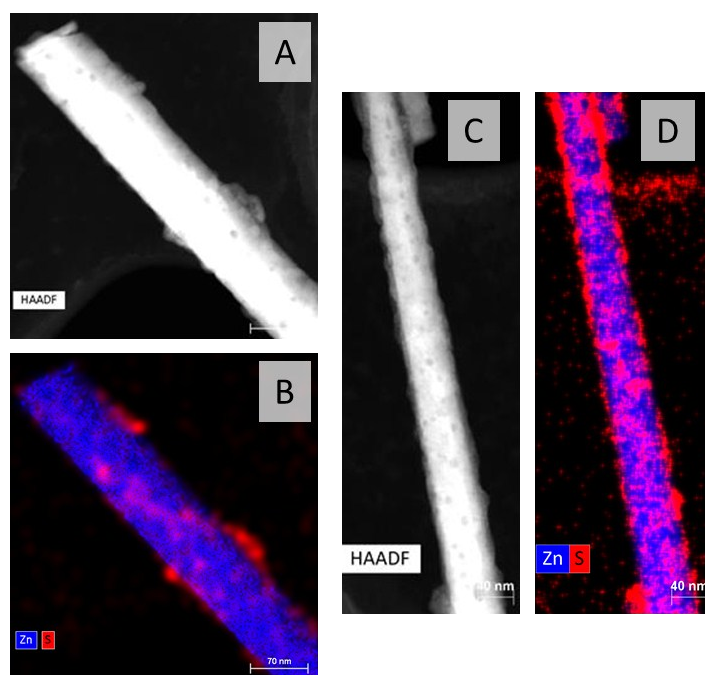
**Figure S7.** Absorption spectrum of the CuInS<sub>2</sub> QD solution in chloroform (blue), and spectral difference between QD sensitized ZnO nanowires with MUPA and ZnO nanowires (black).



**Figure S8.** Effect of CdS passivation layer coating on the absorption spectrum of sensitized TiO<sub>2</sub> substrates.



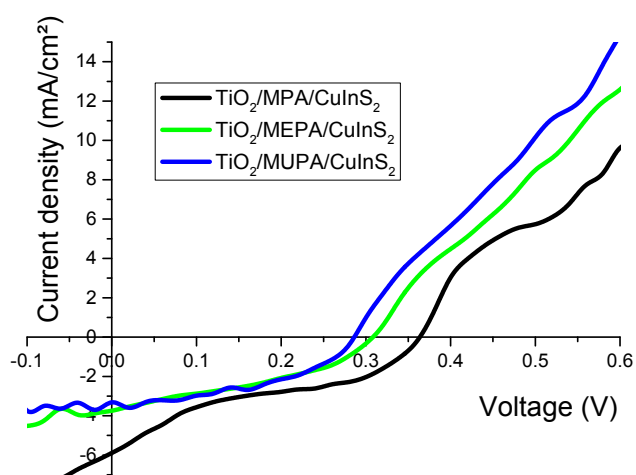
**Figure S9.** PL kinetics of CuInS<sub>2</sub> deposited on ZnO nanowires with different linkers: MEPA (black) and MUPA (blue) as function of time.



**Figure S10.** HAADF (A, C) and EDX (B, D) mapping images of CuInS<sub>2</sub> deposited on ZnO nanowires with (A, B) or without (C, D) MEPA linker. Chemical imaging shows Zn and sulfur rich zones in blue and red, respectively.

**Table S1.** Exponential fit parameters of the PL decay of the assemblies studied

Sample	$\alpha_1$	$\tau_1$ , ns	$\alpha_2$	$\tau_2$ , ns	$\alpha_3$	$\tau_3$ , ns	$\tau_3$ , ns
SiO <sub>2</sub> /CuInS <sub>2</sub>	0.51	93	0.24	13	0.25	486	<b>172</b>
TiO <sub>2</sub> / CuInS <sub>2</sub>	0.28	2	0.52	12	0.2	15	<b>17</b>
TiO <sub>2</sub> /MPA/CuInS <sub>2</sub>	0.29	1.4	0.5	10	0.21	44	<b>15</b>
TiO <sub>2</sub> /MEPA/CuInS <sub>2</sub>	0.24	4	0.49	26	0.26	113	<b>43</b>
TiO <sub>2</sub> /MUPA/CuInS <sub>2</sub>	0.2	5	0.47	36	0.33	169	<b>74</b>
ZnO/MEPA/CuInS <sub>2</sub>	0.25	3	0.55	5	0.2	267	<b>58</b>
ZnO/MEPA/CuInS <sub>2</sub>	0.19	10	0.50	59	0.31	248	<b>108</b>

**Figure S11.** Representative current density—voltage curves of solar cells based on TiO<sub>2</sub> sensitized by CuInS<sub>2</sub> with MPA (black), MEPA (green) and MUPA (blue) linkers.