Supporting Information

Facile Synthesis of Cross-linked Ag-CdS Nanoshell Morphology for Highly Efficient Photocatalytic Activity

Shubhranshu Bhandari¹,*,#, Mir Sahidul Ali²,*,#, Debayan Roy³,*, Suresh Saini⁴,*, Mir Intaj Ali⁵, Mir Sahanur Ali²,6

¹ College of Engineering, Mathematics and Physical Sciences, Environment and Sustainability Institute, University of Exeter, Penryn Campus, United Kingdom, TR10 9FE

² Department of Polymer Science and Technology, University of Calcutta, 92 A.P.C. Road, Kolkata - 700 009, West Bengal, India

³ Independent Researcher, 265, Nripen Sarkar Road, Sahid Nagar, Kanchrapara, North-24 Parganas - 743145, India

⁴ Centre for Nano and Material Sciences (CNMS), Jain Global Campus, JAIN (Deemed-to-be University), Bangalore - 562112 India

⁵ Central Institute of Petrochemicals Engineering and Technology (CIPET): Institute of Petrochemicals Technology (IPT) –Bhubaneswar, B-25, CNI complex, Patia, Odisha - 751024, India.

⁶ Centre for Research in Nanoscience and nanotechnology, University of Calcutta, Kolkata - 700106, West Bengal, India

* These authors have equal contributions.

#Corresponding authors: s.bhandari@exeter.ac.uk, shubhranshu0094@gmail.com, mir.sahidul@gmail.com

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<tr>
<th>Table S1. The elemental weight percentage of Ag-CdS obtained by energy-dispersive X-ray</th>
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<tr>
<td>Elements</td>
</tr>
<tr>
<td>S</td>
</tr>
<tr>
<td>Ag</td>
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<tr>
<td>Cd</td>
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<td>Totals</td>
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Figure S1. (a-b) TEM images of Ag nanoparticles, (c) SEM image of the Ag nanoparticles, respectively

Figure S2. EIS Nyquist plots of CdS and Ag-CdS nanostructures with circuit diagram at the inset
**Figure S3.** Repeated experiments of photocatalytic degradation of MB and R6G in the presence of Ag/CdS composite after the first (Blue) and fourth (Orange) round, respectively.

**Figure S4.** (a-b) Visible light photodegradation of MB and R6G dyes in the presence of CdS nanostructures, respectively.
**Figure S5.** XRD pattern comparison for Ag/CdS heterostructure before dye degradation and after dye degradation for the fourth cycle

**Figure S6.** TOC test for mineralization rate of MB and R6G by ultra-violet photooxidation method with the Ag-CdS catalyst

**Schematic representation of dye degradation mechanism**

\[
\begin{align*}
\text{Ag-CdS} + \text{h} & \gamma \rightarrow \text{Ag(e\text{-})-CdS(h}^+ \rangle \rightarrow \text{(1)} \\
\text{Ag(e\text{-})-CdS(h}^+ \rangle + \text{H}_2\text{O} & \rightarrow \text{Ag(e\text{-})-CdS} + \text{H}^+ + \cdot \text{OH} \rightarrow \text{(2)} \\
\text{MB} + \cdot \text{OH} & \rightarrow \text{Oxidised product} \rightarrow \text{(3)} \\
\text{Ag(e\text{-})-CdS} + \text{O}_2 & \rightarrow \text{Ag-CdS} + \text{O}_2^{-} \rightarrow \text{(4)}
\end{align*}
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