APPENDIX

AVERAGE CRYSTAL SIZE DETERMINATION
BY X-RAY LINE BROADENING

The average crystal size of the materials was calculated by X-ray line broadening technique employing Debye-Scherrer Equation (Cullity 1987).

\[ t = \frac{0.89 \lambda}{\beta \cos \theta} \]

where
- \( t \) = average crystal size of the particles
- \( \lambda \) = Wavelength of the radiation used.
- \( \beta \) = Integral breadth of peak (full width of half maximum)
- \( \theta \) = Bragg diffraction angle

For CdS NPs,

\[ \lambda = 0.154 \text{ nm} \]
\[ \beta = 1.79 \text{ (full width of half maximum)} \]
\[ = 1.79 \times 3.142 \times 2/360 = 0.0313 \text{ radians} \]
\[ \theta = 13.45 \]
\[ t = 4.5 \text{ nm} \]

Average crystal size of nanophotocatalysts

<table>
<thead>
<tr>
<th>Sl.No.</th>
<th>Nanophotocatalysts</th>
<th>20</th>
<th>FWHM</th>
<th>Average crystal size (nm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>ZnS NPs</td>
<td>26.9</td>
<td>1.79</td>
<td>4.5</td>
</tr>
<tr>
<td>2</td>
<td>TiO$_2$ NTs</td>
<td>27.5</td>
<td>2.47</td>
<td>3.27</td>
</tr>
<tr>
<td>3</td>
<td>CdS-ZnS NCs</td>
<td>27.25</td>
<td>3.05</td>
<td>2.65</td>
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<tr>
<td>4</td>
<td>CdS-ZnS/TiO$_2$ NCs</td>
<td>27.05</td>
<td>2.6</td>
<td>3.1</td>
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</tbody>
</table>