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Facile, Rapid and Efficient Doping of Amorphous TiO₂ by Pre-synthesized Colloidal CdS Quantum Dots

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Various methods have been developed to reduce the band gap of TiO₂ via combining TiO₂ with quantum dots (QDs). However, the attainment of high activity and stability of hybrid QDs/TiO₂ is still a significant challenge since the poor interface contact between QDs and TiO₂. This drawback could be tackled to some extent through optimisation of the preparation technology. The present study suggests a simple hydrolysis route to *in situ* TiO₂ doping by pre-synthesised CdS QDs, which play a role of crystal seeds, pre-planted in liquid titanium alkoxide, for the TiO₂ crystallization process. The comprehensive investigation of the CdS/TiO₂ composite is carried out by X-ray diffraction, UV-Visible spectroscopy, scanning electron microscopy, photocatalytic activity measurements in the photo oxidation of cyclic aromatic organic compounds. The stability of model TiO₂-shell structures on CdS seeds is assessed by means of molecular dynamics simulations. Both experimental and theoretical results confirm the mutual impact of CdS QDs and TiO₂ on their crystallinity. The presence of CdS

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