Photocatalytic Activity of CdS/CdTe Heterodimer Quantum Dots

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Photocatalysis has attracted considerable attention due to its promising application in clean energy sources or degradation of pollutants from water and air. Titanium dioxide (TiO_2) is the most frequently used semiconductor material for the photocatalytic reaction. However, because of its wide band gap (3.2 eV), UV-light is required for electron-hole pair generation. Here, we used CdS/CdTe heterodimer quantum dots as a semiconductor material for efficient photocatalytic reaction. CdS/CdTe heterodimer forms type-II band alignment so that the separation of phogenerated charge becomes more efficient. In addition, since CdS absorbs light from visuble light (VIS) to UV and CdTe does it from near infrared (NIR). Therefore, we can extend available solar spectrum for photocatalytic reaction from NIR to UV light. In this study, we show various photocatalytic reactions such as the reduction of carbon dioxide (CO2) and the degradation of organic pollutants using CsD/CdTe heterodimer quantum dots and discuss the effect of different photocatalytic activity with different morphology of heterodimer.