

The cds particles
added to supporting
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The influence of concentration of CdS particles in supporting electrolyte on photocatalytic activity (PA) of PEO coatings is presented in Fig. 4. C_0 is the initial concentration of MO and C is the concentration after time t . PA varies with the concentration of CdS particles added to supporting electrolyte. TiO₂/CdS coatings formed in supporting electrolyte with addition of CdS particles up to 0.5 g/L show better PA than pure TiO₂ coating, with the highest PA observed for the coating formed in supporting electrolyte with addition of 0.

4 g/L of CdS particles. On the other hand, high concentration of CdS particles in supporting electrolyte significantly reduced PA and even showed significantly lower values than for the pure TiO₂. This indicates that CdS particles have considerable influence on the photocatalytic activity of TiO₂/CdS coatings, i. e., there is an optimal concentration of CdS in TiO₂ coatings that depends on the amount of CdS particles in the supporting electrolyte. Taking into account that the influence of CdS particles incorporated into TiO₂ coatings on morphology and phase structure is negligible, the main contribution of CdS particles to the PA may be in extending the optical absorption range of TiO₂/CdS coatings or in preventing fast recombination process of photogenerated electron/hole pairs.

Fig. 5 shows UV-Vis DRS spectra of pure CdS powder and prepared coatings formed in a supporting electrolyte with various additions of CdS particles. Obviously, TiO₂/CdS coatings do not show the shift of the absorptions into visible light region. All spectra show the band edge at about 385 nm. The absence of adsorption shift might be attributed to low concentration of CdS particles incorporated into coatings, indicating that CdS particles are

suppressing therecombination of photogenerated electron-hole pairs. On the other hand, if concentration of CdS particles incorporated into TiO₂ coatings is too high, it increases the concentration of recombination centers for electron-hole pairs, resulting in lower PA. High sensitivity and nondestructive character render PL technique useful in the field of photocatalysis because information such as the efficiency of charge carrier trapping, immigration and transfer can be obtained [22]. It is generally acknowledged that the increase of PL intensity corresponds to decrease of photocatalytic activity, indicating fast recombination of electron-hole pairs.

PL emission spectra of prepared coatings excited at 350 nm are shown in Fig. 6a. Rise in concentration of CdS particles up to 0.4 g/L in electrolyte causes a decrease in PL intensity, which then starts to increase up to concentration of 1.0 g/L. These results are in accordance with photocatalytic measurements (Fig. 6b), i.

e. the decrease of PL intensity corresponds to increase of PA, indicating slow recombination of electron-hole pairs. For higher concentrations of CdS particles in supporting electrolyte (2 g/L and more) a simultaneous decrease of PL intensity and photocatalytic activity can be related to increased presence of CdS dopants which become capture centers for photoinduced electrons, so that the recombination of electron-hole pairs can be effectively inhibited.