Hydrothermal Low-cost Synthesis of ZnO-GO Nanocomposites

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One of the best known multifunctional semiconductor oxide materials is zinc oxide (ZnO). The wide band gap, high binding energy of exciton, radiation resistance, and high chemical stability make it a promising material for sensors [1], LEDs, solar cells, piezoelectric devices, transistors, etc. Recent studies have shown that composite materials based on ZnO and graphene oxide (GO) can have optical and electrical properties superior to those of ZnO [2].

This work is devoted to the development of the synthesis of photocatalytically active composites based on ZnO and graphene oxide by simple, low-cost effective methods. Graphene oxide was obtained by the Hammers method and then added to a solution for hydrothermal synthesis of zinc oxide. To form zinc oxide nanoparticles, a solution of sodium hydroxide NaOH at room temperature was added dropwise to a glass beaker with a solution of zinc acetate $(CH_3COO)_2Zn\times 2H_2O$, after which the entire solution was thoroughly mixed on a magnetic stirrer for another 15 minutes. The resulting precipitate was washed with distilled water, separated by centrifugation, and then dried in an oven at 125°C for 12 hours. The morphology, structural properties, and photocatalytic activity of the synthesized ZnO-GO samples were studied. Measurement of the photocatalytic activity of the obtained samples was carried out in relation to the degradation of Rhodamine-B (RhB) dye. It was noted that an increase in the GO concentration in the ZnO growth solution makes it possible to obtain more photocatalytically active ZnO – GO composites. Figure 1 shows the morphology of the ZnO-GO powder, containing 0.005 wt% GO, and the change in the optical density spectra of an aqueous solution of RhB in its presence.

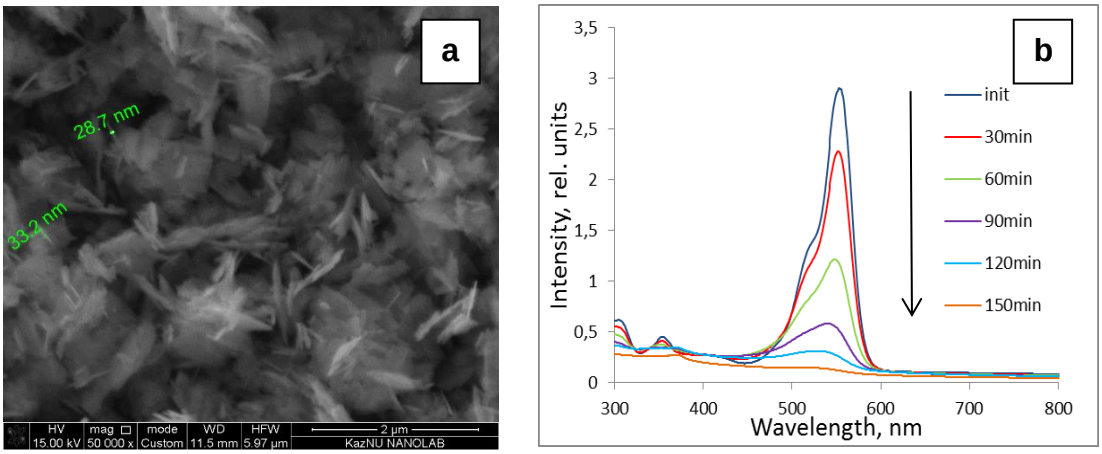

Figure 1 – ZnO-GO sample; a - morphology, b - change in the optical density spectra of an aqueous solution of RhB

References

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