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Photocatalytic performance improvement by doping ag on zno/mwcnts nanocomposite prepared with pulsed laser ablation method based photocatalysts degrading rhodamine b organic pollutant dye

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ZnO/MWCNTs nanocomposite has significant potential in photocatalytic and environmental treatment. Unfortunately, its photocatalytic efficacy is not high enough due to its poor light absorbance and quick recombination of photo-generated carriers, which might be improved by incorporation with noble metal nanoparticles. Herein, Ag-doped ZnO/MWCNTs nanocomposite was prepared using a pulsed laser ablation approach in the liquid media and examined as a degradable catalyst for Rhodamine B. (RhB). Different techniques were used to confirm the formation of the nanostructured materials (ZnO and Ag) and the complete interaction between them and MWCNTs. X-ray diffraction pattern revealed the hexagonal wurtzite crystal structure of ZnO and Ag. Additionally, UV-visible absorption spectrum was used to study the change throughout the shift in the transition energies, which affected the photocatalytic degradation. Furthermore, the morphological investigation by a scanning electron microscope showed the successful embedding and decoration of ZnO and Ag on the outer surface of CNTs. Moreover, the oxidation state of the formed final nanocomposite was investigated via an X-ray photoelectron spectrometer. After that, the photocatalytic degradations of RhB were tested using the prepared catalysts. The results showed that utilizing Ag significantly impacted the photodegradation of RhB by lowering the charge carrier recombination, leading to 95% photocatalytic degradation after 12 min. The enhanced photocatalytic performance of the produced nanocomposite was attributed to the role of the Ag dopant in generating more active oxygen species. Moreover, the impacts of the catalyst amount, pH level, and contact time were discussed.

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Biography

Reham A. Rezk (Ph.D., 2017), Lecturer of Physics at (HTI), Egypt. She is interested in Applied laser physics research; especially Laser Induced Breakdown Spectroscopy (LIBS), Pulse Laser Ablation in Liquid (PLAL) with nanomaterials. She has a list of 9 scientific papers. Now, she is interested in laser physics with simultaneous theoretical identifications (Chemometrics analysis). She is a member of the Optical Society of America (OSA), the Institute of Electrical and Electronics Engineers (IEEE), and Professor Nabil A. Abdel Ghany lab at the National Research Center Institute in Egypt. As well as the Applied Laser Spectroscopy Group (ALS) at National Institute of Laser Enhanced Sciences (NILES), Cairo University in Egypt. She has attended and participated in several international conferences and workshops regarding her field of specialization and teaching quality.

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