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Electrospun NiO, ZnO and composite NiO-ZnO nanofibers: Photocatalytic degradation of dairy effluent

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Among the food wastes, the Dairy Effluent (DE) is considered to be the most polluting one because of the large volume of waste water generated and its high organic load. Photocatalytic degradation of DE and organic dye methylene blue (MB) was studied using zinc oxide nanofibers (ZnO NFs), nickel oxide nanofibers (NiO NFs) and composite zinc oxide-nickel oxide nanofibers (ZnO-NiO NFs). These nano-membranes were characterized with SEM, TEM, XRD and UV studies. The pristine nanofiber membranes were smooth and continuous, with an average diameter of about 400 nm, and held their nanofibrous morphology even after calcination at 600˚C for more than 3 hours of photocatalytic degradation of DE and MB dye. The ZnO NFs and NiO NFs were effective materials for degradation of DE and MB dye. NiO NFs and ZnO NFs showed a maximum degradation of 70% and 75% in DE and 50% and 60% in MB dye, respectively, after 3 hours. The significant enhancement of degradation in the composite ZnO-NiO NFs is attributed to the photoactivity of material under visible light irradiation. The composite ZnO-NiO NFs eliminated 40% of DE and 65% of MB dye, respectively, after 1 hour and maximum degradation of 80% DE after 3 hours and 100% MB dye after 90, min respectively. Overall, this study shows that the nanofibers' morphology strongly enhances the surface activity of the ZnO-NiO photocatalyst when utilized to degrade DE and MB dye at room temperature.

Biography

Muzafar A Kanjwal has completed his PhD from Chonbuk National University, South Korea. Currently, he is working as a Researcher at National Food Institute, Technical University of Denmark. He has published more than 40 papers in reputed journals. His research focuses on photocatalysis, and developing nano/micro structures by electrospinning method.

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