HYDROTHERMAL SYNTHESIS OF COBALT DOPED TIN (IV) OXIDE FOR MICROPLASTIC REMOVAL

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ABSTRACT

Microplastic pollution of water and ecosystem is attracting continued attention worldwide. Due to their small sizes (≤5 mm) microplastic particles are discharged to the environment from treated wastewater effluents. Due to the stability of plastic debris and the fact that it often takes a longer time to decompose, the discharge of plastic waste into water bodies may have a negative influence on the ecosystem in many ways. Therefore, improvement on the existing water treatment technique is required. This study carried out the photocatalytic reaction on the degradation of polypropylene (PP) microplastics under visible light irradiation. SnO_2 were employed as the photocatalyst. SnO_2 nanostructures are usually modified with some metal dopants to enhance the photocatalytic activity. In this work, pure tin oxide (SnO_2), 10% cobalt (Co) doped SnO_2 (10% Co: SnO_2) nanorods were successfully synthesised via hydrothermal method at low temperature (180°C). To investigate the effect of 10% Co dopant on SnO_2 nanorods, structural characterizations were demonstrated using scanning electron microscopy (SEM), x-ray diffraction (XRD) analysis, and an UV-vis spectroscopy. XRD and UV-vis results shows 10% Co: SnO_2 reduced the crystalline size of SnO_2 nanorods. FTIR and SEM was used to analyse the characterization on PP. SEM shows structural changes on the treated PP such as cracks, holes and cavities after the reaction. FTIR shows that photo-oxidation reaction occurs in photodegradation process under visible light where the presence of hydroxyl and carbonyl peaks detected after microplastic treated with 10% Co: SnO_2. 10% Co: SnO_2 photocatalyst had efficiently promote degradation of PP.