Photocatalytic degradation of PE films using TiO_2 hybrid nanocomposite

Zohreh Mesgari, Ph.D. in Applied Chemistry, Research and development department, Fater Rasa Noor holding company, Tehran, Iran.

Abstract (300 word limit)

Polymer waste now a day is a major issue that possess serious threats to human and environmental health. Different polymers like PE, PVC, and PP with high density and low density are one of the most consumed by various industries and also their degradation is a bit difficult. For this many people have started working on effective methods of degradation of these polymers. Among the methods, photocatalytic degradation in the visible light is an alternative option that has received attention recently. In this research, hybrid nanocomposite containing non-metal doped TiO2 (NM-TiO2) and porphyrin organic pigment (PP) has been successfully synthesized and characterized. Therefore, non-metal TiO2 nanoparticles were prepared via sol- gel method at first, and then the hybrid nanocomposite was synthesized by the precipitation method using the modified nanoparticles. Modified nanoparticles and hybrid nanocomposite were characterized by X-ray diffraction (XRD), BET surface area determination, diffuse reflectance spectroscopy (DRS) and simultaneous thermal analysis (TG, DTA). The band gap energy of the hybrid nanocomposite was about 2.53 eV that has been decreased significantly in comparison with non-metal-TiO2 (2.9 eV) and pure TiO2 (3.4 eV). Hence, synthesized hybrid nanocomposite with absorption edge in the visible region is much appropriate for optical applications of photocatalys. Modified of nanostructures has increased the degradation rate of polyethylene films under visible light and those films can degrade under sun light with good rate. This new PE-NM/TiO2/pp composite is an environmental friendly polymer material which could be degraded when exposed to the outdoor environment.

Recent Publications (minimum 5)

Z. Mesgari, J. Saien*; Pollutant degradation over dye sensitized nitrogen doped titania substances in different configurations of visible light helical flow photoreactor; Separation and Purification Technology 185 (2017) 129–139 (ISI).

J. Saien, Z. Mesgari*; Photocatalytic degradation of methyl orange using hematoporphyrin/N-doped TiO2 nanohybrids under visible light:Kinetics and energy consumption; Applied Organometallic Chemistry (2017) (ISI).

J. Saien, Z. Mesgari*; highly efficient visible-light photocatalyst of nitrogen-doped TiO2 nanoparticles sensitized by hematoporphyrin; Journal of Molecular Catalysis A: Chemical 414 (2016) 108–115 (ISI).

Z. Mesgari, M. Gharagozlou*, A. Khosravi, K. Gharanjig; Synthesis, characterization and evaluation of efficiency of new hybrid nanocomposite as photocatalyst for decolorization of methyl orange using visible light irradiation Pc/Fe-TiO2; Applied Catalysis A: General 411–412 (2012) 139–145 (ISI).

Z. Mesgari, M. Gharagozlou*, A. Khosravi, K. Gharanjig; Visible light photocatalytic degradation of methyl orange in aqueous suspension by using nanocrystalline TiO2 impregnated with metal-free phthalocyanine pigment; J. Indian Chem. Soc. 90 (2013) 1-8 (ISI).

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Z. Mesgari, M. Gharagozlou*, A. Khosravi, K. Gharanjig; Synthesis and Characterization of Novel Hybrid Nanocomposite Containing Modified Titanium Dioxide Nanoparticles and Tetraisoindole Organic Pigment (Persian); Journal of Color Science and Technology; 5 (2011).



Biography (150 word limit)

Dr. Zohreh mesgari has completed his PhD in Applied Chemistry by Bu-Ali Sina University. She has an MSc from Amirkabir University of Technology (Tehran Polytechnic) and trained in Institute for Color Science & Technology. She works as research fellow in R&D center at Fater Rasa Noor holding company. She is member of Iranian Chemical Society and the Food and Drug Quality Control Committee.

Email:
Z.mesgari@alumni.basu.ac.ir
mesgari123@yahoo.com

Author details

Full name: Zohreh Mesgari
Session name/ number: -
Category: (Oral/ Poster)
Email id: Z.mesgari@alumni.basu.ac.ir or mesgari123@yahoo.com
Contact number: +989128871337