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Abstract

In Situ Sol-Gel Polybenzimidazole/Titanium Dioxide Nanocomposite Materials for Photocatalytic Degradation of Reactive Black 5 Azo Dye †

Silvia Dimova [1,*], Katerina Zaharieva [2], Filip Ublekov [1], Hristo Penchev [1] and Irina Stambolova [3]

[1] Institute of Polymers, Bulgarian Academy of Sciences, "Akad. G. Bonchev" St., Bl.103A, Sofia, Bulgaria; fublekov@polymer.bas.bg (F.U.); hpen4ev@gmail.com (H.P.)
[2] Institute of Mineralogy and Crystallography "Akad. I. Kostov", Bulgarian Academy of Sciences, "Akad. G. Bonchev" St., Bl. 107, Sofia, Bulgaria; zaharieva@imc.bas.bg
[3] Institute of General and Inorganic Chemistry, Bulgarian Academy of Sciences, "Akad. G. Bonchev" St., Bl. 11, Sofia, Bulgaria; stambolova@yahoo.com
* Correspondence: dimova@polymer.bas.bg
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Abstract: Polymer nanocomposites with incorporated inorganic nanoparticles are interesting materials for study because of their unique properties. Such hybrid nanomaterials find many applications in various fields of technologies. The properties of polymer nanohybrids are combination of polymeric matrix and inorganic nanoparticles [1]. Nanocomposite hybrid powders of meta-Polybenzimidazole/Titanium dioxide containing 20 wt.% of titania were synthesized by a new in situ sol-gel process with the use of different potassium hydroxide PBI low-alcohol mixtures and titanium (IV) isobutoxide precursor. The phase composition and structure of the prepared hybrid polymer nano powders before and after calcination were characterized by powder X-ray diffraction analysis and Fourier-transform infrared spectroscopy. The photocatalytic ability of the obtained Polybenzimidazole/Titania hybrid nanomaterials were investigated for photocatalytic degradation of Reactive Black 5 (RB5) azo dye as model contaminant from aqueous solution under UV illumination. The degree of degradation of Reactive Black 5 dye at 120 min UV irradiation is 58–90%, using synthesized PBI/TiO_2 nanocomposites as photocatalysts.

Keywords: nanocomposite hybrid powder; meta-polybenzimidazole/titanium dioxide; photocatalyst

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