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Topic of Research: **Synthesis, characterization and applications of functionalized polymer nanocomposites**

Findings

Poly (methyl methacrylate) (PMMA) was functionalized with different amino containing compounds and TiO₂ NPs with different wt% to see how functional groups and TiO₂ NPs affect the characteristics of the nanocomposites. The effect of addition TiO₂ nanoparticles on thermal behavior was investigated. The antioxidant activity of functionalized PMMA and its nanocomposites have been analyzed by using 2,2 diphenyl-1-picrylhydrazyl (DPPH) assay. Functionalized polymer and its nanocomposites showed good antioxidant, dye adsorption and antibacterial activity against *E. coli* and *S. aureus*. TGA study of all samples shows the thermal degradation, synthesized functionalized polymer nanocomposite improved thermal stability by 13 °C and remaining weight loss was about 10%. Dye adsorption results showed that functionalized polymer nanocomposites can be used as a low-cost material for effective water treatment and removal of CR dye from industrial effluents. This study not only demonstrates a method for generating flexible functionalized polymers and their nanocomposites, but it also helps to the understand and design polymer nanocomposites with desired features including antioxidant and antibacterial activity. It's worth noting that, by virtue of its application of functionalized polymer and nanocomposites to be useful in both industrial and medicinal applications.

Keywords: PMMA, functionalized PMMA, nanocomposites, antioxidant, antibacterial