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Synthesis of Poly(ethylene terephthalate) Reinforced with Zinc Oxide Nanoparticles via Solution Blending for Prosthetic Socket Material: Physicochemical and Antibacterial Studies

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Abstract This work synthesized recycled poly(ethylene terephthalate) (PET) with zinc oxide nanoparticles (1.0, 3.0, 5.0, and 7.0 wt %) via solution blending, aimed at transforming postconsumer plastic waste into high-value antibacterial materials for prosthetic socket applications. The PET/ZnO composites demonstrated homogeneous dispersion, improved mechanical hardness, and effective antibacterial activity, particularly at 7.0 wt % ZnO. Enhanced surface hydrophilicity and acceptable roughness were also observed. This approach improves prosthetic performance and promotes sustainable healthcare materials by utilizing plastic waste.

Keywords **Keywords Plus:** CRYSTALLIZATION BEHAVIOR; NANO-ZNO; NANOCOMPOSITES; CYTOTOXICITY; NANOFIBERS; RESISTANCE

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