Enhancing the Dyeability and Performance of Recycled Polyethylene Terephthalate with Hyperbranched Polyester

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Abstract : This study aims to examine the impact of hyperbranched polyester (AA-Ph) on the dyeability and color fastness of recycled poly (ethylene terephthalate) (RPET) fabric. AA-Ph was synthesized through single-step melt polycondensation of adipic acid (AA) and phloroglucinol (Ph) and then incorporated into RPET before spinning. The addition of AA-Ph significantly improves the dye uptake of recycled PET when dyed with disperse dye blue 56 due to the introduction of polar groups and aromatic rings. The blends RPET-3 and RPET-5 show strong abrasion resistance, dyeability, and washing fastness. Furthermore, these blends exhibit high moisture absorbance owing to the polar groups and aromatic structures, as demonstrated by exhaustion tests, which enhance perspiration absorption for added comfort in apparel. Overall, RPET-3 and RPET-5 blends are well-suited for various textile applications, especially in garment manufacturing.

Keywords : recycled poly (ethylene terephthalate), hyperbranched polyester, dyeability, dye blue
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