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Investigation of some mechanical and physical properties of bioblend nanocomposites

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Chitosan (CH) / Poly (1-vinylpyrrolidone-co-vinyl acetate) (PVP-co-VAc) blend (50:50) [CH/(PVP-co-VAc)] reinforced with two particle size of TiO2 nanoparticles were prepared by solution casting method. Mechanical tensile strength, Elongation, Young modulus, Thermal conductivity, water absorption, and FTIR analysis were studied for blend and nanocomposites. The tensile results show that the tensile strength and Young's modulus of the nanocomposite films were improved compared with polymer blend [CH/(PVP-co-VAc)] film. The mechanical properties of the polymer blend were improved by the addition of TiO2 with significant increases in Young's modulus (from 2274 MPa to ~2876 MPa) and tensile strength (from 47.87 MPa to 49.65MPa). Strong interfacial bonding between the TiO2 nanoparticles and the [CH/(PVP-co-VAc)], homogenous distribution of the nanoparticles in [CH/(PVP-co-VAc)] are supportive of markedly improved mechanical strength. The thermal accessibility of the [CH/(PVP-co-VAc)] blend and [CH/(PVP-co-VAc)] /TiO2 nanocomposites films show that it decreased in the adding of nanoparticle TiO2. The solubility calculations demonstrate that the nanocomposite has enhanced water resistance. The weight gain decreased with the addition of nano TiO2. Blending chitosan CH with (PVP-co-VAc) improved strength and young modules of the film and increased water uptake because hydrophilic of the two polymers blend films.

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