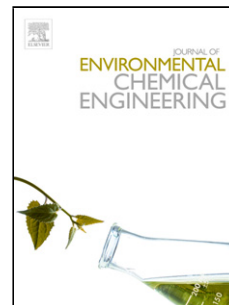


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Structure-Property Relationship of Cellulose Nanowhiskers Reinforced Chitosan Biocomposite Films

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Abstract

Nowadays, the development of bio-based plastics has become causing an attractive research topic in polymer science and engineering area. This is mainly triggered by consciousness of negative effect of the use of petroleum-based plastics after their end-use to the environment. Among the existing renewable material for bio-plastic, chitosan is known to have excellent potential to be tailored as biofilm. However, its inherent weak properties drawback the strength. Therefore, addition of nanofiller such as cellulose nanowhiskers into biopolymer to form bionanocomposite is seems to be effective way to enhance the strength of biopolymer. The aim of this research is to study the effect of cellulose nanowhiskers concentration on chitosan biocomposite films in term of mechanical and thermal properties. Tensile tests revealed the increased tensile strength up to 24.4 MPa at 10 % CNWs concentration and Young Modulus to 858.68 MPa with 25% CNWs concentration. Meanwhile, elongation at break decreased to 3.2 % upon the addition of 25 % CNWs. Besides, thermogravimetric analysis revealed that the addition of CNWs loading on chitosan biocomposite improved the thermal stability of biocomposite. Differential scanning calorimetric displayed addition of CNWs loading at 15 % increased the crystallinity to 40.6 %. It is worth noting that the, incorporation of cellulose nanowhiskers has improved the mechanical and thermal properties of chitosan nanocomposites.

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