

البحث السابع

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Title	Influence of α-Fe₂O₃, CuO and GO 2D nano-fillers on the structure, physical properties and antifungal activity of Na-CMC–PAAm blend.				
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ABSTRACT

The present work aims to improve the uses of the carboxymethyl cellulose–polyacrylamide (Na-CMC–PAAm) blend for energy storage, optoelectronic applications, biological control, and plant disease management. Nano-sized materials (α -Fe₂O₃ nanoplates (NP), CuO NP, and GO nanosheets (NS), were synthesized and incorporated into the blend. The phase purity and morphologies of the used fillers were studied by XRD and HR-TEM. The interactions and complexation between the nano-fillers and the blend chains were investigated using XRD and FTIR spectra. The chemical composition and surface morphology of the nanocomposites were studied using EDS and FE-SEM analysis. UV-vis-NIR spectra revealed that the blend shows about 95%



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ABSTRACT



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transmittance, reduced by 10–30% after doping. The absorption and refractive indices, as well as the optical gaps of the blend, were greatly affected by the doping. The dielectric constant and loss depend on the type of filler and the applied frequency. The maximum ac conductivity of the blend at 303 K and 4.0 MHz is 21.5×10^{-4} S/m and increased to 23.5×10^{-4} S/m after doping with CuO NP. The thermal stability, activation energy, stress–strain curves, and tensile strength are dependent on the filler type. All nanocomposite solutions except the blend exhibited a wide range of antifungal properties against pre- and postharvest phytopathogenic fungi. *Aspergillus niger* among the examined fungi showed high sensitivity to the tested nanocomposite solutions. Furthermore, the CuO/blend nanocomposite had the highest antifungal activity against all tested fungi. Based on that, we suggest the use of CuO/blend and GO/blend nanocomposites to control and combat pre- and post-harvest fungal plant diseases.