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Optical and structural properties of Polyvinyl alcohol loaded with different concentrations of Lignosulfonate

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Polyvinyl alcohol/lignosulfonate (PVA/LS) composite films have been prepared using casting technique. The effect of lignosulfonate concentrations (0.001, 0.005, 0.01, 0.05, 0.1 and 0.5 wt %) on the optical and structural properties of polyvinyl alcohol (PVA) has been investigated using UV–vis spectroscopy and X-ray diffraction. The results indicate that, the addition of LS led to a more compact structure of PVA, which resulted in an increase in its refractive index and amorphous phase. This was associated with a reduction in the optical energy gap that could be attributed to the increase in disorder structural of the composites. Moreover, the transmittance of PVA/LS composite film decreased with the increase of LS doping concentrations onto the PVA matrix. The results reflect the proper dispersion of LS in the PVA matrix that causes a strong intermolecular interaction between LS and PVA suggesting strong hydrogen bond formation between the hydroxyl group in PVA chains and the outer site groups of LS. Further, the transmission of the samples in the wavelength range of 370–780 nm, as well as any color changes, was studied. The color intensity ΔE , which is the color difference between the pure PVA sample and those with different LS concentration, increases with increasing the LS content and was accompanied by an increase in the yellow and red color components.