# Formulation and characterization of in situ generated copper nanoparticles reinforced cellulose composite films for potential antimicrobial applications

ABSTRACT

Cellulose was dissolved in aq.(LiOH C urea) solution pre-cooled to –12.5 C and the wet films were prepared using ethyl alcohol coagulation bath. The gel cellulose films were dipped in 10 wt.% Cassia alata leaf extract solution and allowed the extract to diffuse into them. The leaf extract infused wet cellulose films were dipped in different concentrated aq. copper sulphate solutions and allowed for in situ generation of copper nanoparticles (CuNPs) inside the matrix. The morphological, structural, antibacterial, thermal, and tensile properties of dried cellulose/CuNP composite films were carried out. The presence of CuNPs was established by EDX spectra and X-ray diffraction. The composite films displayed higher thermal stability than the matrix due to the presence of CuNPs. Cellulose/CuNP composite films possessed better tensile strength than the matrix. The composite films showed good antibacterial activity against E.coli bacteria. We conclude that good antibacterial activity and better tensile properties of the cellulose/CuNP composite films make them suitable for antibacterial wrapping and medical purposes.

**Keyword:** Green composites; Copper nanoparticles; In situ generation; nanocomposites; Antibacterial activity; Tensile strength