



# Biosynthesis of copper nanoparticles using aqueous Tilia extract: antimicrobial and anticancer activities

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## Abstract:

A cost-effective method for the biosynthesis of copper nanoparticles (Cu-NPLs) using Tilia extract under optimum conditions has been presented. The use of Tilia extracts for the synthesis of Cu-NPLs has been investigated for the first time. The Cu-NPLs are stable due to in situ bio-capping by the Tilia extract residues. Formation of metallic Cu was revealed by UV-vis and XRD analyses. UV-vis of Cu-NPLs showed an SPR characteristic peak at 563 nm (energy bandgap  $\approx$  2.1 eV). Morphology and size of the as-prepared Cu-NPLs were determined using SEM and TEM studies. TEM observations show that the produced Cu-NPLs are hemispherical in shape with different diameters in the range 4.7e17.4 nm. The electrical conductivity of the Cu-NPLs was determined as  $1.04 \times 10^{-6}$  S cm<sup>-1</sup> (at T  $\approx$  120 K). The antimicrobial studies exhibited relatively high activity against pathogenic bacteria like Gram-positive & Gramnegative bacteria. Anticancer studies demonstrated the in vitro cytotoxicity value of Cu-NPLs against tested human colon cancer Caco-2 cells, human hepatic cancer HepG2 cells and human breast cancer MCF-7 cells. To conclude, Cu-NPLs are promising in electronic devices and they possess a potential anticancer application for some human cancer therapy as well.

## Keywords:

Materials science, Materials chemistry, Nanotechnology

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