

[Home](#) > [Journal of Cluster Science](#) > Article

Mitochondrial Membrane Depolarization, Oxidative Stress Induced Cell Death in Human Pancreatic Adenocarcinoma Cells (PANC-1) Treated with Biologically Engineered Gallic Acid Coated Copper Oxide Nanoparticles

| Original Paper | Published: 15 March 2023

| Volume 34, pages 2665–2680, (2023) [Cite this article](#)[Journal of Cluster Science](#)[Aims and scope](#) →[Submit manuscript](#) →

Shahnaz Majeed , Nur Iwana Naqibah Binti Shamsunazatul, Mohammed Danish, Mohamad Nasir Mohamad Ibrahim, Ravindran Muthukumarasamy & Mohammed Tahir Ansari

239 Accesses 3 Citations [Explore all metrics](#) →

Abstract

Nowadays research is widely going on copper oxide nanoparticles because of their excellent physicochemical, antibacterial, and anticancer properties. In the present study color of the solution changes upon the addition of 5 mM copper sulphate and further changes after gallic acid was added to the cell filtrate of *Proteus mirabilis* (ATCC-299906). The gallic acid coated copper oxide nanoparticles (GA-CuONPs) were further characterized by UV–Visible spectrophotometry, FTIR, SEM, EDX, TGA, DSC, and TEM showed particles are spherical in shape and size ranges from 17 to 45 nm. The antibacterial study revealed that GA-CuONPs were sensitive to *Staphylococcus aureus* with inhibition zone 18.5 ± 7.7 while least sensitive to *Escherichia coli* with inhibition zone 13.0 ± 2.3 . The GA-CuONPs showed IC_{50} value at 106.88 ± 1.33 $\mu\text{g/ml}$ against PANC-1 cells while less toxic towards 3T3-L1 cells with IC_{50} 255.36 ± 0.86 $\mu\text{g/ml}$ through MTT assay. Apoptosis study revealed cell shrinkage, chromatin condensation and membrane blebbing. PANC-1 cells showed 68.85% DCF expression of ROS while cells cycle got arrested in Sub G0/G1 and G2/M phase. Furthermore, 41.38% mitochondrial membrane potential ($\Delta\psi_m$) damage and extensive DNA damage was observed. Therefore, GA-CuONPs could become a promising anticancer agent in the field of biomedicine and cancer therapy.