

Abstract

Synthesis of Anthocyanin-Rich *Red cabbage* Nanoflowers and Their Antimicrobial and Cytotoxic Properties [†]

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Abstract: In this report we developed, for the first time, a novel plant extract–metal ions nanoflower (NFs) and investigate their cytotoxic properties. The major anthocyanins (Anth) of *Red cabbage*, acted as organic component and metal ions, copper (II) (Cu²⁺) and silver ions (Ag⁺) acted as inorganic components. Although Anth-Cu²⁺ nanoflowers are quite compact, uniform and porous morphology, Anth-Ag⁺ nanoflower gives splayed shape. Scanning Electron Microscopy (SEM), Fourier Transform Infrared spectrometry (FT-IR) and Energy-Dispersive X-ray (EDX) spectroscopy and Powder X-ray Diffraction (PXRD) were used to examine the structures of the NFs. The FT-IR results show Cu–O and Cu–N bonds in NF, can be indication of the NFs formation. While antimicrobial activities of the NFs were tested against *Staphylococcus aureus* (ATCC 25923), *Escherichia coli* (ATCC 25922) and *Candida albicans* (ATCC 90028), cytotoxicity studies were performed with MCF7 cell line. The potential mechanisms of antimicrobial and cytotoxic effects of the NFs can be the negatively/positively charged molecules in the plant extracts, which may enhance reaction between the NFs and the cells and the action of the NFs as Fenton like agent for production of Cu⁺ and Ag⁺ ions and various radicals, which cause membrane damage and cell death through oxidative stress.

Keywords: anthocyanin; *Red cabbage*; nanoflower; antibacterial activity; cytotoxicity

Conflicts of Interest: The authors declare no conflict of interest.



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