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Green synthesis of silver chloride nanoparticles: a comparison study in three different species of Curcuma

Green synthesis, a low cost and eco-friendly method, has received much attention as an alternative for the development of inorganic nanoparticles (NPs) such as metals, metal oxides, and metal chlorides. Several applications of silver chloride nanoparticles (AgCl-NPs) have been widely recognized, including catalytic material, ionic conductor material and antibacterial agent. A synthesis method of antimicrobial AgCl-NPs from the leaf extracts of Prunus persica L. has been developed and showed synergistic activity against several pathogenic microorganisms with standard drugs. Therefore, the objective of this work is to compare the potential of three different species of Curcuma genus to produce AgCl-NPs. UV-visible spectroscopy showed that absorption peaks of the synthesized AgCl-NPs from C. longa, C. xanthorrhiza and C. latifolia were 420 nm, 425 nm and 410 nm, respectively. The crystalline nature of the synthesized AgCl-NPs were confirmed by X-ray diffraction (XRD) analysis. The XRD peaks from all plants were obtained at 2Θ = 27.831, 32.244, 46.234, 54.830, 57.480, 67.473 and 76.736 which were corresponding to the (1 1 1), (2 0 0), (2 2 0), (3 1 1), (2 2 2), (4 0 0) and (4 2 0) Bragg's reflections of the cubic structure of metallic AgCl. The data from dynamic light scattering measurement showed that the average size of AgCl-NPs synthesized from C. xanthorrhiza, C. longa, and C. latifolia were 48, 50 and 56 nm, respectively. Moreover, transmission electron microscopy (TEM) revealed that AgCl-NPs obtained from all plants had irregular shapes. This preliminary data suggested that all of these three species of Curcuma had potential to be used for green synthesis of AgCl-NPs. Since they are anticipated to have potential applications as antimicrobial agents, their antibacterial and antifungal activities will be also further investigated.

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