

Green synthesis of spherical shaped silver nanoparticles using *Allium Cepa* leaves extract and its photocatalytic activity

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Abstract.

Spherical silver nanoparticles (AgNPs) (5–15 nm) were synthesized by a simple electrochemical method at room temperature using *Allium Cepa* (AC) leaves extract. AC leaves extract that acts as a reducing and stabilizing agent is capable of producing AgNPs without any agglomeration. The phytochemical properties of the leaves extract including total phenolic content, total flavonoid content, and its active species were studied. The crystallinity, morphology, and functional characteristics of the AgNPs were analyzed using an X-ray diffractometer, a transmission electron microscope, and a Fourier–transform infrared spectrometer, respectively. The characterization results verified the contribution of phenolic acids and flavonoids in reduction of Ag^+ to metallic AgNPs and also in stabilization of the AgNPs. The catalytic activity of the AgNPs was tested towards the photodegradation of 2,4–dichlorophenoxyacetic acid (2,4–D) herbicide, in which showing a remarkable degradation performance of 80%. The results provide strong evidence to support the potential use of AC leaves extract to act as green reducing and stabilizing agents as well as a green electrolyte to synthesize well-scattered spherical shaped AgNPs.

Keywords: Silver nanoparticles, green synthesis, leaves extract.