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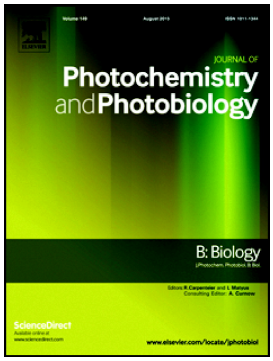

Direct sunlight enabled photo-biochemical synthesis of silver nanoparticles and their Bactericidal Efficacy: Photon energy as key for size and distribution control

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Direct sunlight enabled photo-biochemical synthesis of silver nanoparticles and their Bactericidal Efficacy: Photon energy as key for size and distribution control

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Abstract

It is highly desirable to discover novel green synthesis methods for cheap and scalable synthesis of nanoparticles (NPs) to reduce the negative impact on the environment. But these approaches generally impose great challenge in controlling size, shape, and homogeneity of product NPs. Here in the present study, we report a novel approach enabling direct sunlight and oyster mushroom (*Pleurotus citrinopileatus*) extract for the photo-biochemical synthesis of Ag NPs. Sunlight of different wavelength was used to control the size and distribution of photo-biochemically produced NPs. Interestingly, it is observed that a smaller wavelength of sunlight produces smaller sized of NPs with a narrow size distribution. For examples; blue sunlight produces colloidal silver NPs with an average diameter of ~ 3.28 nm and 0.72 nm size distribution, while full sunlight produces comparatively larger sized (7.08 nm) NPs with wider (2.92 nm) size distribution. Since present approach uses only direct sunlight, freely available renewable energy source, a cheap biological extract as reducing and capping agent and cheap sliver precursor, therefore it is an environment-friendly approach and can be used for the synthesis of NPs at industrial scale. Moreover, the size-dependent bactericidal effect has also been studied against pathogenic, *Escherichia coli,* bacteria. The minimum inhibitory