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Green synthesis with incorporated hydrothermal approaches for silver nanoparticles formation and enhanced antimicrobial activity against bacterial and fungal pathogens

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ABSTRACT: In this study, we report, for the first time, the combination of green and hydrothermal synthesis approaches for biosynthesis of red cabbage extract directed spherical Ag NPs with high yield and monodispersity. The Ag NPs have a very narrow size distribution and enhanced inhibitory properties against *Staphylococcus aureus* (Gram+), *Escherichia coli* (Gram-) and *Candida albicans*. We investigate how experimental parameters influence Ag NPs formation and their inhibitory properties. Integration of hydrothermal approach to the green synthesis made the Ag NP more stable and retarded aggregation for several weeks, which is a significant finding as plant extract-directed Ag NPs are intrinsically unstable and tend to aggregate. The Ag NPs even at low concentration (9.37 ppm) exhibit effective inhibition property for all target pathogens.

KEYWORDS: Red cabbage extract, Ag NPs, green synthesis, hydrothermal synthesis, antimicrobial activity.

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