



## Prospective antimicrobial properties of hybrid chitosan-silver nanomaterials

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### Abstract:

Nanoparticles and biopolymer nanocomposite synthesis from biologically derived extracts offers several advantages such as rapid synthesis, high yields and importantly, the lack of costly downstream processing required producing the particles for multiple applications. At present, nanomaterials are one the biggest branch for improving food shelf life due to external barrier and excellent antimicrobial properties. Moreover, nanoparticle synthesis from plant extracts tentatively offers a route for large scale production of commercially attractive nanoparticles. Hence, in this present study we selected a widely available leaf extract of Custard Apple as an aqueous extract for reducing silver nanoparticles from silver nitrate solution. The aqueous extract of custard apple showed positive result for alkaloids, flavonoids, saponins, carbohydrate, glycosides, phenol, protein and tannins. The calculated average crystallite size of the silver nanoparticles and chitosan - silver nanoparticles were found to be 23 nm and 74 nm from the breadth of the (110 and 111) reflection. In this present study, the prepared silver nanoparticles shown uniform spherical in shape with average particles size of 22.14 to 73.14 nm with high aggregation. The prepared chitosan silver nanoparticles showed uniform cubic in shape with average particles size of 241.82 nm. The larger silver nanoparticles may be due to the aggregation of the smaller ones. This may be due to availability of different quantity and nature of capping agents present in the prepared plant extract. Antibacterial activity prepared silver and chitosan-silver nanoparticles were investigated against different human pathogens by well diffusion method.

### Biography:

Ranjithkumar Rajamani was born in a small village (Melkavatty), in Nilgiris District, Tamil Nadu, India. He is young and dynamic researcher in nano-biotechnology applications. He was obtained a Master of Science (M.Sc) and Doctor of Philosophy (Ph.D) degree in Biotechnology from Bharathiar University, Coimbatore, Tamilnadu, India. Presently he is Assistant Professor, Department of Biotechnology, Kongunadu Arts and Science College, Coimbatore, Tamilnadu, India. He was received Vocational Excellence Award - 2018 from Rotary Ootacamund, The Nilgiris, Tamilnadu, India and Best Young Scientist National Award - 2019 for outstanding in learning, teaching and research from Innovative Research Developers and Publishers (IRDP), Chennai, Tamilnadu, India. His current research interests in the area of Phytochemicals screening, nanobiotechnology and its biological applications. He published more than 60



papers in these and got award for outstanding publications. He is organized International and National level conference and workshops in area of life science for society development. Also, he serving as Editorial Board Member Journal of Pharmaceutics and Drug Research (ISSN: 2640-6152), Associate Editor for Kongunadu Research Journal (ISSN No: 2349-2694) and Reviewer of several journals of international repute. He has annual membership and life time membership in various professional bodies. In additional, he is serving as voluntary visiting researcher at The Nilgiris Education and Research Foundation, The Nilgiris, Tamilnadu, India for encourage science and technology to reach rural community people.

### Publication of speakers:

1. Ranjithkumar Rajamani et al, (2020). Extracellular green synthesis of chitosan-silver nanoparticles using *Lactobacillus reuteri* for antibacterial applications, *Biocatalysis and Agricultural Biotechnology*, 101838.
2. Ranjithkumar Rajamani et al, (2020) C-Phycocyanin of *Spirulina plantesis* inhibits nsp12 required for replication of SARS-COV-2: A novel finding in-silico. *International Journal of Pharmaceutical Sciences and Research*, 11(9), 4271-4278.
3. Ranjithkumar Rajamani et al, (2020). Synthesis and characterization of chitosan/zinc oxide nanocomposite for antibacterial activity onto cotton fabrics and dye degradation applications. *International Journal of Biological Macromolecules*. 164(1), 2779-2787, (2020).
4. Ranjithkumar Rajamani et al, (2020). Facile synthesis, antibacterial mechanisms and cytocompatibility of Ag-Mn-Fe<sub>2</sub>O<sub>4</sub> magnetic nanoparticles. *Ceramic International*, 46, 20150-20115.
5. Ranjithkumar Rajamani et al, (2019). Study on the effect of the concentration of Hibiscus sabdariffa extract on the green synthesis of ZnO nanoparticles. *Results in Physics*. 15, (102807), 1-8.

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