

**Development of Bioactive Drug Formulations Using Eco-friendly
Metallic Nanoparticles for Sustained Drug Release Systems
and Selected *In vitro* Biomedical Applications**

Submitted by

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80_Future Recommendations

Some of the future research associated with the present research work are

- ✓ Systemic optimisation of extraction conditions including temperature, solvent to solid ratio, IL concentration, and extraction time using various task specific ILs, can further improve the yield and selectivity of Allicin and related sulphur containing metabolites.
 - ✓ Although ILs are considered green solvents, their economic and environmental usage depends on effective recovery and recycling. Future studies should focus on developing separation method and evaluating the retention of extraction yield across multiple cycle.
 - ✓ In depth structural elucidation and profiling of garlic derived metabolites using NMR and LC-MS, providing detailed information about the compound identity, and purity.
 - ✓ Evaluation of storage stability, shelf life and bioactivity retention in the garlic-nano encapsulated microsphere formulations.
 - ✓ *In vivo* studies to validate therapeutic efficacy, biocompatibility and pharmacokinetics of nano encapsulated microsphere formulations in suitable animal models.
 - ✓ Investigating the molecular mechanisms observed for the antibacterial, antidiabetic, and anticancer effects of NPs and nanoencapsulated microsphere formulations will further support clinical translation and drug development.
 - ✓ Development of target delivery systems for specific disease conditions (e.g. infections caused by common bacterial strains, cancer, and diabetes).
 - ✓ Scale-up synthesis of nanoparticles and industrial applications in biomedical textiles and coatings.
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