

# Nanostructured Carrier Platforms for the Encapsulation of Drugs and Natural Bioactive Agents

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## Abstract

Encapsulation of drugs, bio-active reagents, molecules and nanoparticles in nanoscale platforms is one of the most promising approaches in the development of nanomedicine that provides for efficient drug loading along with reducing systemic toxicity. Moreover, smart targeting of these nano-vehicular systems can greatly enhance the accumulation of the particular drug at its desired action site(s). Drugs encapsulated in nano-vehicular systems exhibit improved bioavailability, biodistribution and activity relative to non-encapsulated counterparts. In this work we report encapsulation of drug(s) and natural (refined) bioactive reagents for a number of different purposes. Tobacco Mosaic Virus (TMV) is a rod shaped plant virus that is 300 nm long and 18 nm in diameter with a 4 nm channel inside it. The plant virus had been encapsulated with Pt(II)-containing drugs followed by the effusion of it from the virus. Our group also encapsulated Virgin Coconut Oil (VCO) in Solid Lipid Nano-Particles (SLP). VCO loaded SLP showed improved skin penetration as well as better moisturization of the skin. Niosomes are the next generation of Nano-structured Lipid Carriers (NLC) that can be synthesized from non-ionic surfactants and cholesterol. Encapsulation of VCO along with emulsifying agents and nanoparticles showed great potential to inhibit growth of Multidrug Resistant (MDR) bacteria especially *Staphylococcus aureus*. The drug encapsulated niosomes gave extended release of the drug, which could result in decreased dose, lesser days of treatment and more patient compliance.

## References

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## Figures

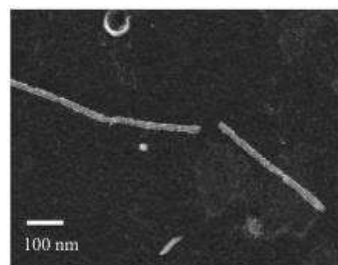


Figure 1. STEM image of TMV encapsulated with Pt(II)-containing drugs

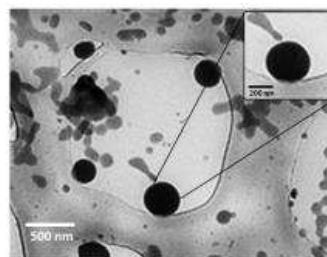


Figure 2. TEM image of SLP encapsulated with VCO. Inset shows a magnified SLP with a diameter of 220 nm



Figure 3. Niosomes encapsulated with VCO effectively eradicated MDR bacterial strains