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# Development of Nanoparticulate Based Chimeric Drug Delivery System Using Drug Bioconjugated Plant Virus Capsid on Biocompatible Nanoparticles

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**Abstract :** The plant virus capsid protein based nanoparticles are extensively studied for their application in biomedical research for development of nanomedicines and drug delivery systems. We have developed a chimeric drug delivery system by controlled in vitro assembly of separately bioconjugated fluorescent dye (as reporting molecule), folic acid (as receptor binding biomolecule for targeted delivery) and doxorubicin (as anticancer drug) using modified EDC NHS chemistry on heterologously overexpressed (E. coli) capsid proteins of cowpea chlorotic mottle virus (CCMV). This chimeric vehicle was further encapsidated on gold nanoparticles (20nm) coated with 5≠ thiolated DNA probe to neutralize the positive charge of capsid proteins. This facilitates the in vitro assembly of modified capsid subunits on the gold nanoparticles to develop chimeric GNPs encapsidated targeted drug delivery system. The bioconjugation of functionalities, number of functionality on capsid subunits as well as virus like nanoparticles, structural stability and in vitro assembly were confirmed by SDS PAGE, relative absorbance, MALDI TOF, ESI-MS, Circular dichroism, intrinsic tryptophan fluorescence, zeta particle size analyzer and TEM imaging. This vehicle was stable at pH 4.0 to 8.0 suitable for many organelles targeting. This in vitro assembled chimeric plant virus like particles could be suitable for ideal drug delivery vehicles for subcutaneous cancer treatment and could be further modified for other type of cancer treatment by conjugating other functionalities (targeting, drug) on capsids.

**Keywords :** chimeric drug delivery vehicles, bioconjugated plant, virus, capsid
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