

Synthesis of Drug-PLGA-AuNP nanomaterial for drug delivery system

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Metallic nanoparticle has unique application in drug delivery system along with well-known application in electronics and textile industries. Gold nanoparticles (AuNP) have got special attention because of its remarkable photothermal effect. Whereas, poly (lactic-co-glycolic acid) (PLGA) known for its biocompatibility and being completely biodegradable. Thus in this study we synthesized novel drug delivery system using Drug-PLGA-AuNP.

We synthesized Drug-PLGA nanoparticles using High Pressure Homogenization, making the method rapid. The process of High-pressure homogenization helped to nanoencapsulate the drug inside the polymer matrix, also increasing its bioavailability. We obtained up to 250nm sized spherical polymeric particles using High pressure Homogenization (HPH) method.

The gold nanoparticles help in bio-imaging and tracking of the drug to its target receptors. We synthesized 10 nm sized and spherical shaped gold nanoparticles using tryptone as reducing agent and stabilizing agent. The synthesized nanoparticles were characterized by using spectroscopic and electron microscopic techniques such as UV-Vis spectroscopy, X ray diffraction, Fourier transform infrared spectroscopy, Transmission electron microscopy (Figure 2).

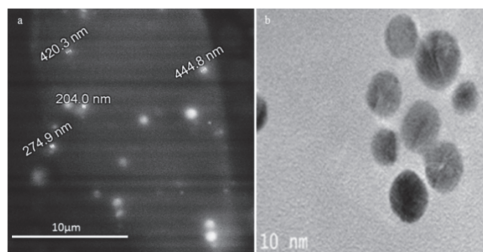


Figure 1: Electron Microscopic images a) Synthesized Drug-PLGA using HPH method; b) Tryptone stabilized AuNP

We synthesized Drug-PLGA-AuNP particles according to the flow chart of Figure 2 and characterized it using electron microscopy- Scanning electron microscopy, and spectroscopic method- UV Vis spectroscopy, Fourier transform infrared spectroscopy.

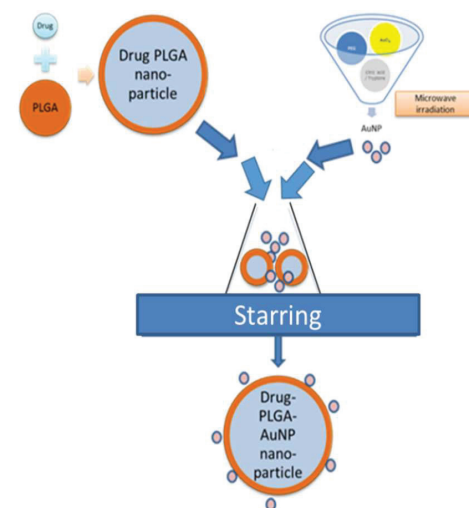


Figure 2: Schematic of synthesis of Drug-PLGA-AuNP complex

Further we studied release profile of Drug-PLGA-AuNP under infra-red irradiation to learn effect of IR irradiation on drug release profile in presence of AuNP for future controlled drug delivery system.

Keywords: Drug-PLGA-AuNP, drug delivery system, High-pressure homogenizer

References

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