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Decoration of PLGA-PEG polymeric nanoparticles with cancer specific peptide ligand for active dual targeting delivery system

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Certain tumor cells overexpress a membrane-spanning molecule, aminopeptidase N (CD13) isoform, which is the receptor for peptides containing the NGR motif. NGR-modified docetaxel (DTX)-loaded PEG-b-PLGA polymeric nanoparticles (NGR-NP-DTX) were developed and evaluated for their *in vitro* potential in HT-1080 cell line. The NGR-NP-DTX containing particles were about 148 nm in diameter with spherical shape and high encapsulation efficiency. Cellular uptake was confirmed both qualitatively and quantitatively by confocal laser scanning microscopy (CLSM) and flow cytometry. Both quantitatively and qualitatively results confirmed the NGR conjugated nanoparticles revealed the higher uptake of nanoparticles by CD13-overexpressed tumor cells. Free NGR inhibited the cellular uptake of NGR-NP-DTX, revealing the mechanism of receptor mediated endocytosis. *In vitro* cytotoxicity studies demonstrated that NGR-NP-DTX formulation was more cytotoxic than unconjugated one, which were consistent well with the observation of cellular uptake. Hence, the selective delivery of NGR-NP-DTX formulation in CD13-overexpressing tumors represents a potential approach for the design of nanocarrier-based dual targeted delivery systems for targeting the tumor cells and vasculature.

Biography

Madhu Gupta is a Research Associate in the Department of Pharmaceutical Sciences, Dr. Hari Singh Gour Vishwavidyalaya, Sagar, India. She has about 07 years of research experience. She is pioneer scientist in the field of nanotechnology and drug delivery field. She has judiously exploited bioligands for targeting of bioactives and drug moiety. She has over 20 research publications to her credit published in journals of high scientific impact and contributed 04 chapters in various renowned books and to several international and national books. She is a National Doctoral fellowship awardee at Department of Pharmaceutical Sciences (India). She is a recipient of best poster award in the nanomedicine field for 2nd International Science Congress held in Mathura (India). She is an active member of APTI in India. She is an acclaimed academician and researcher of high repute. She serves on the potential reviewer of various high repute journals. She is widely visited scientist and delivered invited/popular/keynote addresses in national conferences in India.

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First-principles insights into hydrogenated amorphous silicon and interfaces with crystalline silicon

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Amorphous silicon (a-Si) and hydrogenated amorphous silicon (a-Si:H) are the model amorphous systems, while heterojunctions of amorphous and crystalline (c-Si) are used in solar cells, offering tuned light absorption and reasonable efficiency. There remain fundamental questions regarding: (1) the effect of hydrogen on the optical properties of a-Si:H, (2) the structure of the a-Si:H/c-Si interface and core-shell silicon nanowires (SiNW) (3) the electronic and optical properties of the a-Si:H/c-Si heterojunction and core-shell SiNW. In this contribution, we use large-scale atomistic simulations of a-Si, a- Si:H , a-Si:H/c-Si heterojunctions and core shell SiNW models to show that: (1) the hydrogen concentration has no effect on the optical and mobility gaps of a-Si:H, so long as the H concentration is at saturation and (2) the formation of the a-Si:H/c-Si heterojunction can show effects on the optical properties due to the surface orientation and the relative thickness of the a-Si:H and c-Si regions. In addition to that our calculation of optical band gap of amorphous-crystalline silicon interfaces shows optical gaps that are sensitive to surface orientation and thickness of the amorphous region. Our model suggests a rational strategy to tune the light absorption properties in aSi:H/cSi solar cell structures based on structural properties. Finally, based on the knowledge bulk and interface models we have generated one dimensional core shell SiNW. The SiNW nanowires used in the solar cells are composed of crystalline Si core surrounded by an amorphous Si shell. Thus, the model studied in this work generated by partial melting of crystalline SiNW and quickly quenching to trap the amorphous-crystalline NW structure, which is characterised with, e.g. structural characterization, electronic, optical and transport properties.

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