

March 17, 2022

Webinar

Journal of Material Sciences & Engineering

ISSN: 2169-0022

DNA-gold nanoparticles interaction: influence of surface charge and optical absorption coefficient

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Statement of the Problem: the treatment of genetic diseases requires many conditions to be able to accomplish an applicable purpose. Among one of these conditions is the transfection vehicle to be used. The vehicle must meet characteristics such as protection from DNA degradation, specific surface charge and load release. Gold nanoparticles (AuNPs) have been studied in nanomedicine for gene therapy, and promising results have been shown. Also, to avoid degradation of the genetic material, specific polymers have used as vehicles.

In this research AuNPs with chitosan, a biodegradable biopolymer, were used as DNA carriers. Their interaction with plasmid DNA was measured by electrophoresis. Zeta sizer was used to evaluate their surface charge and its optical absorption coefficient was also directly measured by photoacoustic techniques.

Conclusion & Significance: The feasibility of photoacoustic techniques to directly measure the optical absorption coefficient (B) of colloidal suspensions of gold nanoparticles was demonstrated, these values were compared with the corresponding ones obtained indirectly through absorbance measurements.

The stability of complexes formed with gold, chitosan and plasmid DNA nanoparticles, and their adhesion strength was demonstrated by electrophoresis. A correlation was observed between the amount of chitosan in the nanocomplexes and their ability to integrate into the plasmid DNA itself. It is recommended to deepen the study of the retention capacity of plasmid DNA, due to the correlation observed regarding the amount of chitosan-DNA.

Recent Publications

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Biography

Chávez-Sandoval BE, is a Research-Professor in the Universidad Autónoma Metropolitana (UAM) in Mexico City. She is a biologist with a master's degree in molecular evolution and a doctorate in environmental sciences and engineering; She has teach at the main public and private universities in Mexico like IPN, UACM,UAM, UNAM, among others, she has received numerous awards and distinctions such as the UAM academic merit medal for excellence in her doctoral studies; she participates as a referee of scientific journals like ContactoS UAM, Mundo Nano UNAM, Journal of Nanoparticles & Nanotechnology (helicsgroup.net).CA, USA, and Biomedical Microdevices-Springer. BioMEMS and Biomedical Nanotechnology, Berlin Germany. Dr. Chavez-Sandoval's research lines are mainly about nanoscience and nanotechnology linked to ecology and genetics (gene therapy, cytotoxicity) and optimization of cell cultures with nanoparticles biosynthesized. Finally, she even participates in the political life of her country, as coordinator of higher education and as Director of the Environment.

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