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Examining the cellular uptake of CMP nanoparticles

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Engineered Nanomaterials (ENs) such as silica, ceria and alumina NPs are widely used in Chemical Mechanical Planarization (CMP) processes. However, the toxicity and cellular uptake of these NPs, which are strongly dependent on their physiochemical properties and their interaction with cells, are largely unknown. The objective of this work is to study and quantify the cellular uptake of colloidal silica NP slurries before and after CMP processing of GaAs substrates. Although it would seem that ENs can be taken up by cells, the evidence is disparate and the mechanism of uptake is either unclear or in their infancy. This is because of lack of accurate data on the physicochemical properties such as size, surface area, distribution, composition, purity, crystallinity, solubility, and aggregation and surface structure. First, a comprehensive physical and chemical characterization of the pre and post-CMP slurries are carried out using DLS, zeta potential, BET, XRD, FTIR, Raman, SEM and TEM. Next, GaAs substrates are polished with colloidal Silica NP slurries at standard conditions for 1-10 minutes on an IPEC Westech Avanti 472 CMP polisher. This is followed by post-CMP cleaning to remove used slurry material. Finally, cell exposure studies are carried out with A549 lung epithetical cell lines for 6-48 hours by comparing the cell viability of new and used slurries. The cellular uptake studies involves immunofluorescence staining of exposed cells, ultrastructural characterization (using TEM), Electrochemical Cell-substrate Impedance Sensing (ECIS) and bioanalytical analysis of digested cells (using ICP-OES).

Biography

S Aravamudhan is currently an Assistant Professor of Nanoengineering at the Joint School of Nanoscience and Nanoengineering, North Carolina A&T State University. He completed his PhD in Electrical Engineering from University of South Florida and postdoctoral research at Georgia Institute of Technology in Nanotechnology and Biomedical Engineering.

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Herbal drugs and herbal mediated silver nano particles as anti diabetics – A novel review

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Diabetes is a metabolic disorder where in human body does not produce or properly uses insulin, a hormone that is required to convert sugar, starches, and other food into energy. Diabetes results in abnormal levels of glucose in the bloodstream. Herbal plants are very common in use in our day to day life easily available and are having least side effects and low cost. Nanotechnology is a branch of science and technology conducted at the nanoscale, which is about 1 to 100 nanometers. Nanoscience and nanotechnology are having a wide range of applications in fields, such as green chemistry, herbal drug research. With respect to herbal medicine the drug will take more time to show the anti diabetic activity because herbal drugs are basically insoluble in nature. To overcome this kind of problems nano herbal medicine is needed. Herbal mediated silver nanoparticles (HMSNP's) are having less size, more surface area, more solubility and target specificity due to these reasons the optimum dose reach to systemic circulation and onsite of action is very quick with herbal medicine. Recent studies on the use of herbal plant extracts in synthesis of HMSNP's are a relatively new and exciting area of research with considerable potential for development of new methods in nano medicine. HMSNP's capable to treat diabetes effectively by having very less size comparatively with herbal extracts Current review represents an overview of biosynthesis of HMSNP's and their advanced applications to treat diabetes.

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