S1-P010

Characterization of PEG-conjugated AuNPs by Using ToF-SIMS Imaging, Spectroscopic and Statistical Techniques

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Various organic- and bio-conjugated nanoparticles have been studied extensively for biological applications in medical diagnoses and drug delivery systems. Gold nanoparticles (AuNP) and poly(ethylene glycol) (PEG) are known biocompatible materials to be used in vivo and are becoming increasingly important in biomedical applications. In this work, we investigated the stability of PEG-conjugated AuNPs, dialysis and centrifuge effects after synthesis or pegylation of AuNPs as a function of elapsed time by using ToF-SIMS imaging technique along with dynamic light scattering (DLS), UV-visible absorption spectroscopic and statistical analyses. Roughly 15-nm-sized AuNPs were synthesized in a citrate-conjugated form, and then converted into the thiol-terminated PEG (O-[2-(3-Mercaptopropionylamino)ethyl]-O′-methylpolyethyleneglycol, M.W.=5 kDa) form. Based on our data, we will show that ToF-SIMS imaging analysis along with DLS, UV-visible absorption and statistical analyses would be a useful method to evaluate stability of PEG-conjugated AuNPs in various environmental conditions.