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Protein antifouling properties of a chemical vapor deposited alkyl-functional carboxysilane coating characterized using quartz crystal microbalance

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The protein resistant properties of a chemical vapor deposited alkyl-functional carboxysilane coating (Dursan®) were compared to that of an amorphous fluoropolymer (AF1600) coating and stainless steel by studying non-specific adsorption of various proteins onto the coating surfaces using quartz crystal microbalance with dissipation monitoring (QCM-D). A wash solution with non-ionic surfactant, polyoxyethyleneglycol dodecyl ether (or Brij 35), facilitated 100% removal of residual bovine serum albumin (BSA), mouse immunoglobulin G (IgG), and normal human plasma proteins from the Dursan surface, whereas these proteins remained adsorbed on the bare stainless steel surface. Mechanical stress in the form of sonication demonstrated robustness of the Dursan coating to mechanical wear and showed no impact on the coating's ability to prevent adsorption of plasma proteins. Surface delamination was observed in case of the sonicated AF1600 coatings and it led to adsorption of plasma proteins. The combination of the robust alkyl-functional carboxysilane coating (Dursan) and non-ionic surfactant in the wash buffer that we have reported here is certainly a step forward toward mitigation of surface biofouling in biotechnological applications, specifically in case of automated immunoassay analyzers, reagent manufacturing, and filling setups.

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Study of the structural and morphology features of Bi2O3 nanoparticles

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An improved way and surfactant free approach has been employed for the synthesis of Bismuth oxide (Bi2O3) nanoparticles at very low temperature of 110°C. This new approach is based on a reaction of bismuth powder and de-ionized (DI) water without the use of any additives or surfactants. XRD and SEM have been employed to characterize the Bi2O3 nanoparticles. By the morphological investigations using SEM, it was observed that the grown Bi2O3 products are having dimensions in the range of 3 nm to 25 nm. The reported method besides being organics free is economical, fast and free of pollution, which will make it suitable for large scale production.

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