

Formation of Underbrushes on thiolated Poly (ethylene glycol) PEG monolayers by Oligoethylene glycol (OEG) terminated Alkane Thiols on Gold.

Adding underbrushes of oligoethylene glycol (OEG) to monolayers of long chain PEG molecules on a surface is one of the strategies^[1] in designing a suitable platform for antifouling purpose, where it is possible to have high graft density and molecular conformational freedom^[4] simultaneously, thereby by maximal retention of activity of covalently immobilised antifouling enzyme^[2] on PEG surfaces along with resistance to protein adsorption^[3]. Here we present some of our studies on the addition of OEG thiol molecules over a self assembled monolayer of PEG thiol on gold. The kinetics of addition of OEG thiol to monolayers of PEG thiol was followed using X-ray photoelectron spectroscopy (XPS), which indicated the time point of maximum graft density and beyond this time point there was predominant desorption of OEG thiol as indicated by the C/O ratio. The initial increase in graft density was reflected in the superior resistance towards non specific adsorption of proteins as shown by N 1s signal. We also performed protein adsorption studies using quartz crystal microbalance (QCM-D). Studies involving addition of alkane thiol instead of OEG terminating alkane thiol showed the importance of OEG part of the molecule in superior resistance towards protein adsorption. The surfaces with underbrushes were imaged using atomic force microscopy (AFM) to detect any changes in mechanical properties of PEG thiol covered surfaces upon addition of OEG thiol.

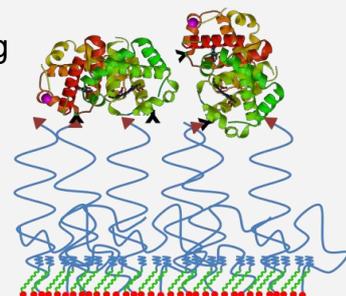


Figure 1: Schematic of under-brushes of OEG thiol on PEG thiols.

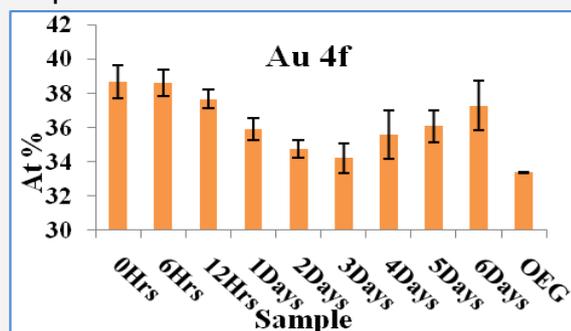


Figure 10: XPS studies of PEG-SH monolayer exposed to OEG-SH over a period of 6 days, showing the variation in substrate signal.

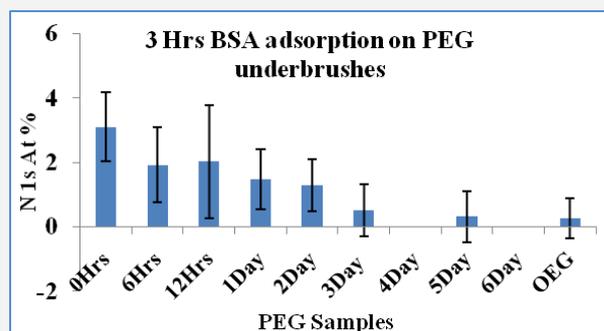


Figure 11: XPS studies of protein adsorption using 1 mg/mL BSA solutions for 3 Hrs on PEG underbrushes.

References:

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