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A bi-layer formation of plasma films over QTF surface for improving the stability of amine-rich layer

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Plasma polymerization (PlzP) method is a common way to control the thickness of film growth with a uniform coating over the substrate materials. Especially, adjustable chemical composition of the thin film achieved by plasma modification has become vital over the years, that directly influence the performance and the functionality of the polymers for desired application. At this point due to their positively charged property, amine-rich thin films step forward for biotechnological applications. They can provide covalent bonding with negatively charged biomolecules such as enzymes, DNA or living cells. However, high amine concentration affects the thin films' stability negatively because of the magnitude of the surface energy. To overcome this problem two different hydro-carbon groups which are n-Hexane(HEX), and n-Heptane(HEP) were applied to the surface by PlzP before amine-rich coating. The main reason of selecting hydrocarbon group is; pre-coating can be a key tool since this coating has high degree of cross-linking as well as having thermal and chemical stability compared to other polymer thin films. These different films examined from first day to the thirtieth day by using Contact Angle, Frequency and Resistivity measurements. After completing the surface functionalization step, Glutheraldehyde (GA) [25% (v:v)] applied to the thin film surfaces for activating amine groups with aldehyde. To check GA performance a model protein, Bovine serum albumine (BSA), was used to control the binding performance of modified and activated surfaces. This work showed that, two steps PlzP samples are more stable than single step PlzP samples, this mean; the surfaces which contain hydro carbon groups, effects directly the performance and long-term stability of amine-rich surfaces.This study leads a potential development of a biosensor platform for detection of antibody, toxins etc. in all types of environment.

Keywords
Plasma polymerization
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thin film stability