Surface modification of cell culture media for low binding affinity

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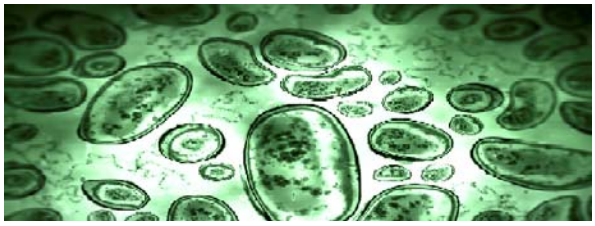


Culture media designed to maintain cell suspensions require surfaces with very low affinity for cell attachment. Hydrogel coatings are uncharged, hydrophilic and have excellent adsorption resistance to proteins and cells. These coatings need to be covalently bound to the substrate surface to ensure their stability in aqueous media. Plasma surface treatment can be used either to activate the surface for hydrogel attachment, or to deposit hydrogel-like materials onto the surface using Plasma Enhance Chemical Vapor deposition (PECVD).

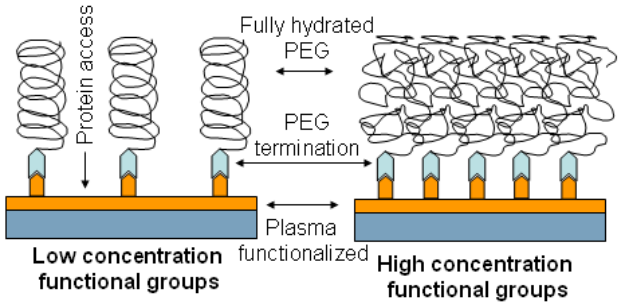
What is plasma?

Plasma is a gas energized to a state of electrical conductivity. Chemically it is a highly reactive environment that is used to change the properties of surfaces without affecting the bulk material. Plasma is a powerful tool in solving surface preparation problems. It provides a reliable, consistent, and environmentally friendly method of conditioning culture plates and cellular matrices to control cell attachment.

Bio-burdens, mold release agents, volatile hydrocarbons and other contaminating species are cleaned from the substrates by the cool, yet energetic environment of the plasma. After cleaning, plasma conditions and reactant gases are tuned either to graft functional chemical groups to the surface or to polymerize materials onto surfaces by PECVD. Monomer species introduced into the plasma are activated chemically. When these activated monomers come into contact with the surface workpiece they bind chemically initiating the graft or polymerization process. Surface properties of the deposited coating are determined within the first few tens of nanometers of the surface.

Hydrogel Surface Modification

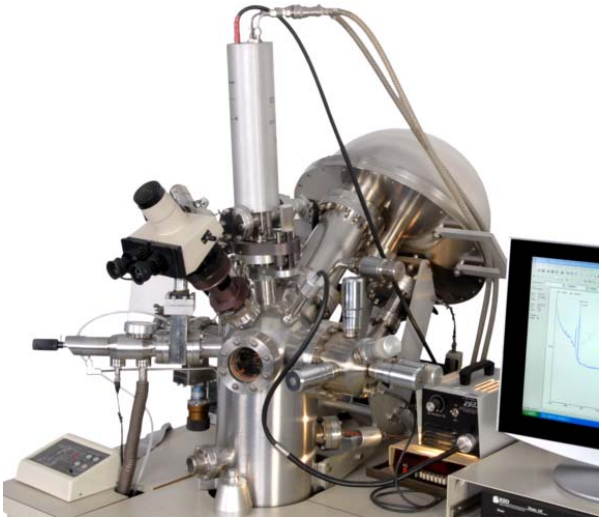
Hydrogel polymers such as polyethyleneglycol (PEG) have excellent resistance to the adsorption of biomaterials. Due to their neutral charge and non-polar hydrophilic nature they do not interact hydrophobically or electrostatically with cells and proteins. These inherent properties of hydrogels make them ideally suitable for use as non-adherent coatings for cell culture media.



The hydrogel coating itself must stably adhere to the substrate, enough to withstand possibly several washing cycles. Plasma treatment of the substrate ensures a covalently bound coating either by grafting the hydrogel polymer directly to the surface by PECVD or by grafting functional groups to the surface that will bond to functional groups on the hydrogel. In the latter case it is critical that the surface is functionalized with a high enough concentration to provide enough binding sites for the hydrogel to effectively coat the surface. PVA TePla have developed a new process for polymer substrates that grafts x5 times the number of functional groups that was previously attainable using plasma surface modification.

How does PVA TePla America validate their processes?

X-ray photoelectron spectroscopy (XPS) and surface derivatization techniques are used to quantify the percentage of the surface that has been functionalized with desired chemical groups.



XPS (Perkin Elmer) with 500mm analyzer

What does PVA TePla America offer?

At PVA TePla America we offer a full line of vacuum and atmospheric gas plasma systems. Our reliable, easy-to-operate products deliver some of the most advanced and innovative solutions for a wide variety of industrial applications. We also offer clean area contract processing services with ISO 9001:2008 certification.

This allows you to access gas plasma technology without up front capital expenditure on labor and/or facilities. Additionally, we offer free proof of process as an incentive to evaluate our plasma technology.

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