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Low background and high sensitivity protein microarrays for bio-marker screening and profiling

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Protein microarray or protein chip is an important tool in proteomics. It allows the expression and functional profiling of thousands of biomarkers in a single shot. However, duplicating the success of the DNA chip for the protein chip has been difficult. This arises in part from difficulties with surface chemistry. Ideally, the surface chemistry for protein microarray fabrication should satisfy the following criteria: the surface resists non-specific adsorption; bonding between a protein molecule and a solid surface is balanced to provide sufficient stability but minimal disturbance to the delicate three-dimensional structure of the protein; and the local chemical environment favors the immobilized protein molecules to retain their native conformation and activity. The low background and high sensitivity condition is particularly important for applications involving biomarkers in complex samples, such as serum or plasma. We have developed functional surfaces based on our proprietary high density poly-ethyleneglycol (PEG) brushes. The PEG brush not only ensures exceptionally low background but also provides an optimal local environment for the immobilized protein molecules to retain optimal activity. We explore the application of PEG brush surfaces in cancer research by systematically comparing the sensitivity and specificity of protein microarrays in biomarker profiling with the traditional diagnostics method of ELISA. These experiments demonstrate the potential of our optimized protein microarrays in the detection of low abundance biomarkers.

Biography

Athena Guo has received her PhD degree in Biochemistry from the University of Texas at Austin. After Post-doctoral training at NIH and Washington University School of Medicine, and briefly joining the Research faculty at University of Minnesota, she founded MicroSurfaces, Inc. and has served as its CEO since. She was a member on several NIH study sessions, author of 30 scientific papers and patents, and PI on multiple SBIR awards from NIH and NSF. She has been responsible for the development and launch of MicroSurfaces' product lines, e.g. the ZeroBkg® surfaces, Fluid Array surfaces, etc. to serve the biomedical research community.

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