

Nanoscale Strategies for Single Cell Proteomics

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Current in-vitro techniques have problems when used for accurately identifying the small differences in protein content, function and interactions, which are characteristic of disease. One of the main reasons for lack of reliability in protein analysis for disease diagnostics is a lack of test sensitivity. This is because, for many tests, to be reliable, they need to be performed on a homogeneous, and therefore very small, sample. A nanotechnology approach may overcome the current limits in low abundant protein detection. We propose here to use novel nano-immuno assay strategies based on Atomic Force Microscopy nanografting, for capturing proteins in nL volumes and concentration up to tens of pM. Such nanoscale devices allow for the regulation of the density, accessibility, and lateral homogeneity of active biorecognition sites. When combined with microwells, fabricated by soft-lithography and implemented on a cell-sorting set-up, can be used for trapping histologically defined cells, for the independent protein profiling/secretome analysis in each well.