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Nano/micro Porous based immunoassay microarray platform for improving detection sensitivity

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Abstract

Microarray based immunoassays are currently undergoing intense developments for the detection of low abundant protein biomarkers in human biofluids such as serum, urine and CSF (cerebrospinal fluid). The microarray format can ultimately offer advantages in terms of a low amount antibody consumption, high sensitive readout, and multiplex performance. Such developments could hold promise of earlier diagnosis of disease, reducing the need for biopsy and providing post therapy monitoring of patients for recurrence. To increase the assay sensitivity, several amplification methods have been proposed that are linked to modifying the detection antibodies by e.g. dendritic amplification, catalyzed signal amplification with colorimetric readout or detection with rolling-circle amplification. On the other hand, enriching the concentration of the capture antibody may also enhance sensitivity yet maintaining a simple assay protocol. Increased density of the immobilized antibody on the each microarray spot can offer improved capturing capacity of target antigen, which in turn increases the number of antigen bound to the primary antibody and consequently more completed sandwich pairs are achieved at the end of the assay leading to increased detection signals.

The current work targets the development of an improved protein detection method based on nanostructured silicon surfaces (porous silicon) that provides simple and rapid microarray immobilisation of antibodies by physisorption in a high surface area matrix. The vastly enlarged surface area increases the density of immobilised antibody, allowing a higher antigen binding density per microarray spot, resulting in increased sensitivity. Our developed P-Si based microarray also has advantages of its simplicity, robustness and time saving method.

Biography

In 2009, Sangwook Lee received Ph.D degree from the University of Tokyo in environmental and ocean engineering. He then moved to Lund University in Sweden as postdoctoral researcher working for developing microarray immunoassay platform. He is now working in Riken (Japan) as an independent researcher. His main research interests are developing high sensitive and selective immunoassay platform for early diagnosis.