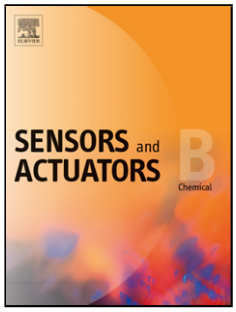

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Enhancing the sensitivity of DNA microarrays by metal-enhanced fluorescence using vertical nanorod structures

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Highlights

- GLAD is simple and effective technique for fabricating large area substrates
- Significant fluorescence enhancement was observed on vertical nanorod substrates
- A maximum enhancement factor of ~200X was achieved on 500nm long nanorods substrate

ABSTRACT

Metal-enhanced fluorescence (MEF) has significant potential to increase the sensitivity of fluorescence detection by allowing fluorophores to interact with enhanced electromagnetic fields generated by the localized surface plasmon resonance effects of metallic nanostructures. In this study, the MEF of silver (Ag) vertical nanorods (VNR) arrays fabricated by glancing angle deposition were studied for a DNA microarray. To maximize the enhancement effect of Ag-VNR, Ag-VNR arrays with various lengths were fabricated, and fluorescence signals from the Ag-VNR substrates were measured and compared to glass and commercial Amine slides (Amine 2®, Array-it, USA). For the fluorescence signal measurement, Cy5-conjugated Kallikrein-related peptidase 7 (KLK-7-Cy5) DNA probes were spotted on each substrate, and their fluorescence signal was measured after blocking and washing processes. A maximum enhancement factor 200x that of the glass substrate was obtained from a Ag-VNR with 500 nm length and was 36 times greater than the commercial Amine slide.