Seok-min Kim, J Microb Biochem Technol 2016, 8:2(Suppl)
http://dx.doi.org/10.4172/1948-5948.C1.017



International Conference and Expo on
Water Microbiology & Novel Technologies
July 18-19, 2016 Chicago, USA

## Development of silver nanorods enhanced fluorescence substrate for microarray analysis

**Seok-min Kim**
Chung-Ang University, South Korea

Metal-enhanced fluorescence is a powerful technology to improve the sensitivity of fluorescence analysis by allowing fluorophores to interact with enhanced electromagnetic fields generated by the localized surface Plasmon resonance (LSPR) effects of metallic nanostructures. To apply metal-enhanced fluorescence technology to disposable DNA or protein microarray analysis, metallic nanostructures need to be fabricated on the full area of a glass slide at low cost. We used a glancing angle deposition (GLAD) process to fabricate Ag nanorods on the whole area of glass slide to serve as an inexpensive and large-area metal-enhanced fluorescence substrate. The GLAD is a physical vapor deposition process in which the substrate is placed at an angle of <15° between the evaporating flux and the substrate surface. When atomic mobility is limited, a self-shadowing effect during deposition results in a highly porous film of isolated nanorods. One can obtain various lengths, densities and shapes of nanorod structures by controlling deposition time, glancing angle and in-plane rotation speed of substrate, respectively. To examine the feasibility of the proposed substrate for the microarray analysis and maximize the signal enhancement, Ag nanorods with different lengths and shape were deposited on glass slides. A 10 nm thick Ni layer and a 40 nm thick Ag layer were sequentially deposited on the glass slide to improve adhesion between the Ag nanorods and the substrate before the GLAD process. To examine the enhancement factor of the GLAD MEF substrates, Streptavidin-conjugated Cy5 was dissolved in buffer solution at 100 ng per ml to 100 μg per ml and spotted onto the substrates. After drying for 24 hours in a refrigerator, the fluorescence signal was measured using a microarray scanner at an excitation wavelength of 635 nm. From the fluorescence measurement experiments, the maximum signal enhancement of ~91x was obtained from the substrate with 750 nm long tilted nanorod structure.

### Biography

Seok-min Kim has received his PhD degree from the School of Mechanical Engineering at Yonsei University, South Korea. He is currently an Associate Professor in the School of Mechanical Engineering at Chung-Ang University, South Korea. His current research interests include design and fabrication of micro/nanostructures for optical biosensors, micro fluidic chips, concentrator photovoltaic system, digital display, LED lighting and enhanced boiling heat transfer surface.

smkim@cau.ac.kr

**Notes:**