Analytical and Bioanalytical Chemistry

Electronic Supplementary Material

FRET detection of Octamer-4 on a protein nanoarray made by size-dependent self-assembly[1]

Phat L. Tran, Jessica R. Gamboa, David J. You, Jeong-Yeol Yoon

[1]Preliminary results of this paper were presented at SPIE Defense, Security and Sensing Symposium at Orlando, Florida, USA, 13-17 March 2009, conference number 7313, paper number 731306, and at IEEE/ICME International Conference on Complex Medical Engineering, Tempe, Arizona, USA, 9-11 April 2009.

Movie S1: Development of a protein nanoarray

A 0.5 µl of about 0.025% (w/v) solid content of non-antibody-conjugated and antibody-conjugated beads in PBS-BN were serially pipetted onto the protein chip by pipette tips. These droplets of bead suspension were transported to the array area (where the nanometer wells were patterned) using a vibrated metal wire (o.d. = 0.5 mm) (Fig. 2).

The metal wire was connected to a microcontroller (Arduino Duemilanove, SparkFun Electronics, Boulder, Colorado) interfaced with a USB port that can be programmed to control the three-axis of the droplet manipulator. A Nintendo game pad was attached to the microcontroller so that x-, y- and z-movements of a metal wire could be made possible from the experimenter's input. Details can be found elsewhere [17]. The water contact angle of PMMA is ca. 70°. This is not enough to make "wire-guide" droplet manipulations [17]. Hence, the metal wire was vibrated to make necessary x- and y-movements. This vibration provided sufficient energy for micro- and nanobeads to assemble into nanometer wells. Droplets travelled across the patterned area up to three times, followed by removal from that area. Additional droplet of 10 mM PBS was transported and moved over the same area to remove weakly bound particulates. Fig. 2 shows the snapshots of these droplet movements, and Fig. 3 shows the experimental setup of three-axis droplet manipulator. A complete movie is available for this "wire-guide" droplet manipulator system.