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Nanotextured PDMS Substrates for Enhanced Roughness and Aptamer Immobilization for Cancer Cell Capture MUHYMIN ISLAM, ARIF MAHMOOD, MD. BELLAH, Nano-Bio Lab, University of Texas at Arlington, Arlington, TX 76019, USA, YOUNG-TAE KIM, Department of Bioengineering, University of Texas at Arlington, Arlington, TX 76010, USA, SAMIR IQBAL, Nano-Bio Lab, University of Texas at Arlington, Arlington, TX 76019, USA — Detection of circulating tumor cells (CTCs) in the early stages of cancer is requires very sensitive approach. Nanotextured polydimethylsiloxane (PDMS) substrates were fabricated by micro reactive ion etching (Micro-RIE) to have better control on surface morphology and to improve the affinity of PDMS surfaces to capture cancer cells using surface immobilized aptamers. The aptamers were specific to epidermal growth factor receptors (EGFR) present in cell membranes, and overexpressed in tumor cells. We also investigated the effect of nano-scale features on cell capturing by implementing various surfaces of different roughnesses. Three different recipes were used to prepare nanotextured PDMS by micro-RIE using oxygen (O_2) and carbon tetrafluoride (CF_4). The measured average roughness of three nanotextured PDMS surfaces were found to impact average densities of captured cells. In all cases, nanotextured PDMS facilitated cell capturing possibly due to increased effective surface area of roughened substrates at nanoscale. It was also observed that cell capture efficiency was higher for higher surface roughness. The nanotextured PDMS substrates are thus useful for cancer cytology devices.

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