Abstract Submitted
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The Effects of Nanotexturing Microfluidic Platforms to Isolate Brain Tumor Cells[1] MUHYMIN ISLAM, ADEEL SAJID, YOUNG-TAE KIM, University of Texas at Arlington, SAMIR M. IQBAL, Nano-Bio Lab, Electrical Engineering, Bioengineering, University of Texas at Arlington — Detection of tumor cells in the early stages of disease requires sensitive and selective approaches. Nanotextured polydimethylsiloxane (PDMS) substrates were implemented to detect metastatic human glioblastoma (hGBM) cells. RNA aptamers that were specific to epidermal growth factor receptors (EGFR) were used to functionalize the substrates. EGFR is known to be overexpressed on many cancer cells including hGBM. Nanotextured PDMS was prepared by micro reactive ion etching. PDMS surfaces became hydrophilic uponnanotexturing. Nanotextured substrates were incubated in tumor cell solution and density of captured cells was determined. Nanotextured PDMS provided >300% cell capture compared to plain PDMS due to increased effective surface area of roughened substrates at nanoscale as well as mire focal points for cell adhesion. Next, aptamer functionalized nanotextured PDMS was incorporated in microfluidic device to detect tumor cells at different flow velocities. The shear stress introduced by the flow pressure and heterogeneity of the EGFR overexpression on cell membranes of the tumor cells had significant impact on the cell capture efficiency of aptamer anchored nanotextured microfluidic devices. Eventually tumor cells were detected from the mixture of white blood cells at an efficiency of 73% using the microfluidic device. The interplay of binding energies and surface energies was major factor in this system.

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Samir Iqbal
University of Texas at Arlington

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