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Surface Design for Efficient Capturing of Rare Cells in Microfluidic Device YALING LIU, Lehigh University, DAN DEPIETRO, ANTONY THOMAS, CHI-MON CHEN, SHU YANG, University of Pennsylvania — This work aims to design, fabricate, and characterize a micro-patterned surface that will be integrated into microfluidic devices to enhance particle and rare cell capture efficiency. Capture of ultralow concentration of circulating tumor cells in a blood sample is of vital importance for early diagnostics of cancer diseases. Despite the significant progress achieved in development of cell capture techniques, the enhancement in capture efficiency is still limited and often accompanied with drawbacks such as low throughput, low selectivity, pre-diluting requirement, and cell viability issues. The goal of this work is to design a biomimetic surface that could significantly enhance particle/cell capture efficacy through computational modeling, surface patterning, and microfluidic integration and testing. A PDMS surface with microscale ripples is functionalized with epithelial cell adhesion molecule (EpCAM) to capture prostate cancer PC3 cells. Our microfluid chip with micropatterns has shown significantly higher cell capture efficiency and selectivity compared to the chips with plane surface or classical herringbone-grooves.

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