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Bacterial locomotion, adsorption and growth over chemically patterned surfaces MARYAM JALALI, MEHDI MOLAEI, JIAN SHENG, Texas Tech University — Complex dynamic interactions between bacteria and chemically patched interface that mimics the heterogeneous energy landscape of a real-life interfacial environment are studied in the paper. We explore effects of these spatially varying chemical patches on bacterial locomotion, adsorption, biofilm formation and the film growth rate. Using micro-fabrication and soft-lithography, we have fabricated PDMS microfluidic channels with a solid substrate covered by micro-scale chemical patches. Arrays of 2D geometries of characteristic scales varying from 10 to 50 μm are transferred onto a glass substrate by soft-lithography. The substrate is functionalized to generate alternating hydrophobic and hydrophilic regions and bonded with the channel. The 3D swimming characteristics near these surfaces, such as swimming velocity, linear and angular dispersions, are measured *in-situ* using 3D digital holographic microscopy. The observations are used to examine the mechanisms involved in adsorption and desorption of swimming bacteria onto the substrate. Long-term experiments are conducted to quantify the growth rate and structures of colony. A correlation between various length scales of the substrate and bacteria motility are observed.

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