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Electrochemical determination of the onset of bacterial surface adhesion AKHENATON-ANDREW JONES, CULLEN BUIE, Massachusetts Institute of Technology — Microbial biofouling causes economic loss through corrosion and drag losses on ship hulls, and in oil and food distribution. Microorganisms interacting with surfaces under these open channel flows contend with high shear rates and active transport to the surface. The metallic surfaces they interact with carry charge at various potentials that are little addressed in literature. In this study we demonstrate that the Levich curve, chronoamperometry, and cyclic voltammetry in a rotating disk electrode are ideal for studying adhesion of microbes to metallic surfaces. We study the adhesion of *Escherichia coli*, *Bacillus subtilis*, and 1 μm silica microspheres over a 0.15 – 37.33 dynes $\cdot$ cm^{-2} or shear rates of 14.73 – 3727.28 s^{-1} range. Our results agree with literature on red blood cells in rotating disk electrodes, deposition rates from optical systems, and show that we can quantify changes in active electrode area by bacteria adhesion and protein secretion. These methods measure changes in area instead of mass, are more accurate than fluorescence microscopy, and apply to a larger range of problems than on-chip flow devices.

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