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Fluctuations of Bacteria-laden Microbeads in a Liquid VURAL KARA, CHARLES LISSANDRELLO, Department of Mechanical Engineering, Boston University, JOAN O'CONNOR, Lynn English High School, JOSE ALBERTO ROMERO RODRIGUEZ, Department of Mechanical Engineering, The University of Texas at El Paso, LE LI, KAMIL EKINCI, Department of Mechanical Engineering, Boston University — The motion of bacteria adhered on surfaces may lead to powerful approaches for novel diagnostic tests. Examples were recently shown using microcantilevers on which bacteria were adhered using surface chemistry [1,2]. In these experiments, the presence of bacteria led to an increase in the fluctuations of the microcantilevers in the frequency range 1-100 Hz. After administering antibiotics, the fluctuations returned to their control value. Here, we build on these studies by monitoring the fluctuations of micro-beads with bacteria adhered on their surfaces. We coat the micro-beads with Poly D Lysine (PDL) in order to attach *Escherichia coli.* We measure the fluctuations of the beads in motility buffer media using an optical microscope with and without bacteria. We calculate the diffusion coefficients from the mean square displacements (MSD) and correlate these with the presence of bacteria on the beads. These studies lay the foundation for the development of a rapid antibiotic susceptibility test based on bacterial activity.

[1] Lissandrello, C. et al. Nanomechanical motion of Escherichia coli adhered to a surface. Appl. Phys. Lett. 105, 113701 (2014).
[2] Longo, G. et al. Rapid detection of bacterial resistance to antibiotics using AFM cantilevers as nanomechanical sensors. Nat. Nanotechnol. 8, 522–526 (2013).

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