Measuring motility of soil bacteria in a microfluidic porous media model

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Abstract

Bradyrhizobium diazoefficiens is a soil bacterium that fixes atmospheric N_2 in symbiosis with soybean, being used as biofertilizer [1]. This soil bacterium possesses two different flagellar systems, a single thick subpolar flagellum, and several thin lateral flagella. We use microfabricated devices to imitate the soil intricate structure to study in a laboratory the bacterial motility and investigate the role of each flagellar system.
The motility parameters (average speed, characteristic reorientation time, reorientation angles) were measured and characterized in detail for two *B. diazoefficiens* strains, USDA 110 (wild type), which has both flagellar systems, and a mutant USDA 110 Δ*lafA*, which only has the subpolar flagella in bulk and in confinement conditions. Three devices were fabricated to provide different degrees of confinement with channel width = 20 μm, 10 μm, and 5 μm, and disordered defects used to simulate soil grains.

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References

[1] Swimming performance of Bradyrhizobium diazoefficiens is an emergent property of its two flagellar systems. J. I. Quelas, M.J. Althabegoiti, C. Jimenez-Sanchez, A.A. Melgarejo, V.I. Marconi, E. J. Mongiardini, S.A. Trejo, F. Mengucci, J.J. Ortega-Calvo and A.R. Lodeiro. Sci. Rep. ***6****, 23841, (2016). DOI: 10.1038/srep23841.*