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Quantifying the rate of biofilm growth of *S. meliloti* strains in microfluidics via the diffusion coefficient of microspheres MATTHEW DORIAN, EFFROSYNI SEITARIDOU, Oxford College of Emory University — Understanding the rate of biofilm growth is essential for studying genes and preventing unwanted biofilms. In this study, the diffusion coefficient (D) of polystyrene microspheres was used to quantify biofilm growth rates of *Sinorhizobia meliloti*, a nitrogen fixing bacteria that forms a symbiotic relationship with alfalfa plants. Five strains were studied, two wild types (8530 $expR^+$ and 1021) and three mutants in the exopolysaccharide (EPS I, EPS II) synthesis (8530 $exoY$, 9034 $expG$, and 9030-2 $expA1$); 1021 and 9030-2 $expA1$ are known to be unable to form biofilms. Each strain was inserted into a microfluidic channel with the microspheres. As the cultures grew, the spheres' D values were obtained every 24 hours for 4 days using fluorescence microscopy. Although the D values for 9030-2 $expA1$ were inconclusive, 8530 $expR^+$, 8530 $exoY$, and 9034 $expG$ showed significant decreases in D between 3 days of growth ($|z| > 2.25$, $p < 0.025$). The data also indicated that 8530 $expR^+$ and 8530 $exoY$ grew at similar rates. There was no significant change in D for 1021 ($\chi^2(2) = 5.76$, $p > 0.05$), which shows the lack of a structured biofilm community. Thus, D can be used as an indicator of the presence of a biofilm and its development.

Effrosyni Seitaridou
Oxford College of Emory University

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