

Abstract Submitted  
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**Microfluidic experiments to quantify microbes encountering oil water interfaces**<sup>1</sup> JIAN SHENG, MARYAM JALALI, MEHDI MOLAEI, Texas Tech University — It is known that marine microbes are one of the components of biodegradation of crude oil. Biodegradation of crude oil is initiated by microbes encountering the droplet. To elucidate the key processes involved in bacterial encountering the rising oil droplets we have established microfluidic devices with hydrophilic surfaces to create micro oil droplets with controlled sizes. To quantify effect of motility of bacteria on their encounter rate, using high speed microscopy, we simultaneously tracked motile bacteria and solid particles with equivalent sizes encountering oil droplets. The results show that in the advection dominant regime, where the droplet size and the rising velocity are large, bacterial motility plays no role in the encountering rate; however, in the diffusion dominant regime, where the swimming velocity of the cells are comparable with rising velocity and Peclet number of particles is small, motility of the cells increases their encounter rate. Ongoing analysis focus on developing a mathematical model to predict the encounter rate of the cells based on their size, swimming speed, and dispersion rate and the size of oil droplets.

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