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Charge Transport Behavior in Microfluidic Microbial Energy Conversion Devices ALOKE KUMAR, PARTHA MUKHERJEE, ABHIJEET BOROLE, MITCHEL DOKTYCZ, Oak Ridge National Laboratory, Oak Ridge, TN 37831, USA — Microbial energy harvesting devices utilize anode-respiring bacteria (ARB), present as a biofilm matrix, to generate electrical current from organic matter. The conductive biofilm matrix in the anode compartment plays a key role in the overall charge transport behavior. Especially, biofilm kinetics and ARB community dynamics are of paramount importance influencing the anode overpotential, which is further dependent on the pH variation. In this work, we present a theoretical framework to study the charge transport characteristics with concomitant biofilm kinetics, substrate utilization, diffusion and migration in a microfluidic device with microbial energy generation.

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