

Abstract Submitted  
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**Wall-induced self-diffusiophoresis of active isotropic colloids**

EHUD YARIV, Technion — While chemically-active homogeneous spherical particles do not undergo self-diffusiophoresis in free solution, they may do so when suspended in the vicinity of a solid boundary. We explore this possibility using a first-order kinetic model of solute absorption, where the relative magnitude of reaction to diffusion is characterized by the Damkohler number  $Da$ . When the particle is remote from the wall, it is repelled from it with a velocity that scales inversely with the square of distance. The opposite extreme, when the ratio  $\delta$  of separation distance to particle size is small, results in the anomalous scaling  $\delta^{\frac{\sqrt{1+2Da}-1}{2}}$  of the solute concentration in the narrow gap separating the particle and wall. This irrational power may only be obtained by asymptotic matching with solute transport outside the gap. For  $Da < 4$  the self-propulsion speed possesses the same scaling, being set by the large pressures forming in the gap through a lubrication-type mechanism. For  $Da > 4$  the particle velocity is  $O(\delta)$ , set by the flow in the region outside the gap. Solute advection is subdominant to diffusion in both the remote and near-contact limits, and accordingly affects neither the above scaling nor the resulting approximations.

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