Synthetic model microswimmers near walls

Ketzetzi, S.

Propositions

accompanying the thesis

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I. Considering the strong impact of nearby walls on catalytic microswimmer behavior, accounting for their presence in the modeling could unravel missing details of their propulsion mechanism.
Chapters 2 and 3 of this thesis.

II. The tendency of catalytic swimmers to propel at a fixed height above the wall of the container, and the locking of their orientation with respect to the wall could share the same origin.
Chapter 3 of this thesis.

III. In applications inside patterned environments, wall curvature modulations could offer precise control on microswimmer self-assembly.
Chapter 4 of this thesis.

IV. Going beyond the use of confining boundaries, slip and swimmer shape could be exploited to guide and tune microswimmer motion inside complex environments.
Chapters 2 and 6 of this thesis.

V. Brown *et al.* proposed self-electrophoresis as the mechanism responsible for catalytic swimmer propulsion, based on their measured speed decrease with increasing salt concentration. However, in view of recent findings, their interpretation which uses theory for bulk swimmer motion should be revisited, as measurements were performed on particles near a wall.
Brown et al. Soft Matter 10: 4016 (2014), Ketzetzi et al. PRL 125: 238001 (2020).

VI. It is surprising that Ebbens *et al.* could measure the speed of their polystyrene particles with size smaller than a micrometer by performing two-dimensional measurements in the middle of their cuvettes.
Ebbens et al. PRE 85: 020401(R) (2012).

VII. Controlled experiments that employ 3D-microprinting to produce particles with shape variations while at the same time preserving the location, amount, and catalyst surface coverage will enable the effect of shape on swimmer motion to be unambiguously determined. *Doherty et al. Soft Matter 16:10463 (2020).*

VIII. Acoustic levitation could provide novel insights into the propulsion mechanism of catalytic swimmers as it may aid in measuring their 3-dimensional motion away from walls.
Wang et al. ACS Nano 6:6122 (2012).

IX. During the Covid-19 pandemic mental health awareness grew substantially all over the world. It is essential that such awareness persists beyond the pandemic, so that, one day, the remaining stigma surrounding mental illness is lifted entirely.