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Leiden

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Swimming modes & interactions of anisotropic active colloids

Riedel, S.M.I.

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Stellingen

Behorende bij het proefschrift

Swimming Modes & Interactions of Anisotropic Active Colloids

- I. In self-propelled particles with shapes continuously tunable between spheres and rods, cluster formation is optimal for bent rods with an opening angle of 180° .
Chapter 2 of this thesis
- II. The propulsion direction in catalytic active particles can change with increasing fuel concentration when the microswimmer possesses an anisotropic shape.
Chapter 3 of this thesis
- III. The geometric shape and size of the key particle strongly influences the overall lock-and-key clustering behavior which provides insights into the stability of individual pairs.
Chapter 4 of this thesis
- IV. The collective rotation of a bound pair plays a critical role in determining lock-and-key pairing as well as crescent-crescent pair longevity.
Chapter 2 and 4 of this thesis
- V. For 3D-microprinting to become a widespread fabrication technique for anisotropic colloids used in phase behavior experiments, challenges in resolution and printing speed have to be resolved.
Kiefer et al. *Light: Advanced Manufacturing* (2024)4:3
- VI. The combination of chemical polarity and shape-dependent solute diffusion explains the different swimming directions for prolate, oblate and spherical particles as well as the fuel concentration-coupled behavior of crescent-shaped microswimmers observed in Chapter 3.
S. Michelin and E. Lauga, Scientific Reports 7, 42264 (2017)
- VII. Introducing error correction mechanisms in active colloidal assemblies will pave the way to the design of structures with complexity similar to those found in biology.
C. Sharma and A. Walther, Angew. Chem. Int. Ed. 61, e202201573 (2022)
Q. Zhu, et al., Phys. Rev. Research 6, L042057 (2024)
- VIII. The field of active matter is increasingly evolving into an engineering discipline.
K. M. Kreienbrink, et al., Nat. Commun.. 16, 6062 (2025)
- IX. A good supervisor has a greater impact on your motivation than the content of your research.
- X. Combining work and parenthood should be recognized more for what it truly is: a significant achievement that requires resilience, adaptability and commitment.

Solenn Riedel

Leiden, 10th July 2026