Synthetic model microswimmers near walls
Ketzetzi, S.

Author: Ketzetzi, S.
Title: Synthetic model microswimmers near walls
Issue date: 2021-06-29

Bibliography

[1] Ran Nathan et al. "A movement ecology paradigm for unifying organismal movement research". In: *PNAS* 105 (2008), pp. 19052–19059. DOI: 10.1073/pnas.0800375105.

[2] William Bialek et al. "Statistical mechanics for natural flocks of birds". In: *PNAS* 109 (2012), pp. 4786–4791. DOI: 10.1073/pnas.1118633109.

[3] Daniel S. Seara et al. "Entropy production rate is maximized in non-contractile actomyosin". In: *Nat Commun* 9 (2018), p. 4948. DOI: 10.1038/s41467-018-07413-5.

[4] Antoine Bricard et al. "Emergent vortices in populations of colloidal rollers". In: *Nat Commun* 6 (2015), p. 7470. DOI: 10.1038/ncomms8470.

[5] M. C. Marchetti et al. "Hydrodynamics of soft active matter". In: *Rev. Mod. Phys.* 85 (2013), p. 1143. DOI: 10.1103/RevModPhys.85.1143.

[6] Francesco Ginelli. "The Physics of the Vicsek model". In: *Eur. Phys. J. Special Topics* 225 (2016), pp. 2099–2117. DOI: 10.1140/epjst/e2016-60066-8.

[7] M. Reza Shaebani et al. "Computational models for active matter". In: *Nature Reviews Physics* 2 (2020), pp. 181–199. DOI: 10.1038/s42254-020-0152-1.

[8] Sriram Ramaswamy. "The Mechanics and Statistics of Active Matter". In: *Annu. Rev. Condens. Matter Phys.* 1 (2010), pp. 323–345. DOI: 10.1146/annurev-conmatphys-070909-104101.

[9] G. De Magistris and D. Marenduzzo. "An introduction to the physics of active matter". In: *Physica A* 418 (2015), pp. 65–77. DOI: 10.1016/j.physa.2014.06.061.

[10] Nature. *"Active Matter"*. 2019. URL: https://www.nature.com/collections/hvczfmjfzl.

[11] Soft Matter RCS. *"Active Matter"*. 2019. URL: https://pubs.rsc.org/en/journals/articlecollectionlanding?sercode=sm&themeid=103bdf9d-d5bc-470f-929d-69a63949f318.

[12] Roland G Winkler Gerhard Gompper and et al. "The 2020 motile active matter roadmap". In: *J. Phys.: Condens. Matter* 32 (2020), p. 193001. DOI: 10.1088/1361-648X/ab6348.

[13] Alan C. H. Tsang et al. "Roads to Smart Artificial Microswimmers". In: *Adv. Intell. Syst.* 2 (2020), p. 1900137. DOI: 10.1002/aisy.201900137.

[14] Daniel J Webre, Peter M Wolanin, and Jeffry B Stock. "Bacterial chemotaxis". In: *Current Biology* 13 (2003), R47–49. DOI: 10.1016/S0960-9822(02)01424-0.

[15] Benjamin M. Friedrich and Frank Jülicher. "Chemotaxis of sperm cells". In: *PNAS* 104 (2007), pp. 13256–13261. DOI: 10.1073/pnas.0703530104.

[16] Osborne Reynolds. "An experimental investigation of the circumstances which determine whether the motion of water shall be direct or sinuous, and of the law of resistance in parallel channels". In: *Philosophical Transactions of the Royal Society* 174 (1883), pp. 935–982. DOI: 10.1098/rstl.1883.0029.

[17] E. M. Purcell. "Life at low Reynolds number". In: *American Journal of Physics* 45 (1977), p. 3. DOI: 10.1119/1.10903.

[18] Jens Elgeti, Roland G. Winkler, and Gerhard Gompper. "Physics of Microswimmers - Single Particle Motion and Collective Behavior". In: *Rep. Prog. Phys.* 78 (2015), p. 056601. DOI: 10.1088/0034-4885/78/5/056601.

[19] Netta Cohen and Jordan H Boyle. "Swimming at low Reynolds number: a beginners guide to undulatory locomotion". In: *Contemporary Physics* 51 (2010), pp. 103–123. DOI: 10.1080/00107510903268381.

[20] Eric Lauga and Thomas R Powers. "The hydrodynamics of swimming microorganisms". In: *Rep. Prog. Phys.* 72 (2009), p. 096601. DOI: 10.1088/0034-4885/72/9/096601.

[21] Wen Yin et al. “Biofilms: The Microbial ”Protective Clothing” in Extreme Environments”. In: *Int J Mol Sci* 20 (2019), p. 3423. DOI: 10.3390/ijms20143423.

[22] Guido Panzarasa et al. “Transient supramolecular assembly of a functional perylene diimide controlled by a programmable pH cycle”. In: *Soft Matter (Communication)* 16 (2019), pp. 591–594. DOI: 10.1039/C9SM02026H.

[23] Charlie Gilbert et al. “Living materials with programmable functionalities grown from engineered microbial co-cultures”. In: *bioRxiv* (2019). DOI: 10.1101/2019.12.20.882472.

[24] H.-W. Huang et al. “Adaptive locomotion of artificial microswimmers”. In: *Sci. Adv.* 5 (2019), eaau1532. DOI: 10.1126/sciadv.aau1532.

[25] Jeremie Palacci et al. “Living Crystals of Light-Activated Colloidal Surfers”. In: *Science* 339 (2013), pp. 936–940. DOI: science.1230020.

[26] Alexander P. Petroff, Xiao-Lun Wu, and Albert Libchaber. “Fast-Moving Bacteria Self-Organize into Active Two-Dimensional Crystals of Rotating Cells”. In: *Phys. Rev. Lett.* 114 (2015), p. 158102. DOI: 10.1103/PhysRevLett.114.158102.

[27] Alexander P. Petroff et al. “Biophysical basis for convergent evolution of two veil-forming microbes”. In: *R. Soc. open sci.* 2 (2015), p. 150437. DOI: https://doi.org/10.1098/rsos.150437.

[28] Ada-Ioana Bunea and Rafael Taboryski. “Recent Advances in Microswimmers for Biomedical Applications”. In: *Micromachines* 11 (2020), p. 1048. DOI: 10.3390/mi11121048.

[29] Cynthia Richard, Juliane Simmchen, and Alexander Eychmüller. “Photocatalytic Iron Oxide Micro-Swimmers for Environmental Remediation”. In: *Zeitschrift für Physikalische Chemie* 232 (2018), pp. 747–757. DOI: 10.1515/zpch-2017-1087.

[30] Jonathan R. Howse et al. “Self-Motile Colloidal Particles: From Directed Propulsion to Random Walk”. In: *Phys. Rev. Lett.* 99 (2007), p. 048102. DOI: 10.1103/PhysRevLett.99.048102.

[31] Walter F. Paxton et al. "Catalytic Nanomotors: Autonomous Movement of Striped Nanorods". In: *J. Am. Chem. Soc.* 126 (2004), pp. 13424–13431. DOI: 10.1021/ja047697z.

[32] Hong-Ren Jiang, Natsuhiko Yoshinaga, and Masaki Sano. "Active Motion of a Janus Particle by Self-Thermophoresis in a Defocused Laser Beam". In: *Phys. Rev. Lett.* 105 (2010), p. 268302. DOI: 10.1103/PhysRevLett.105.268302.

[33] Giovanni Volpe et al. "Microswimmers in patterned environments". In: *Soft Matter* 7 (2011), pp. 8810–8815. DOI: 10.1039/C1SM05960B.

[34] Mojca Vilfan, Natan Osterman, and Andrej Vilfan. "Magnetically driven omnidirectional artificial microswimmers". In: *Soft Matter* 14 (2018), pp. 3415–3422. DOI: 10.1039/C8SM00230D.

[35] Daniel Ahmed et al. "Artificial Acousto-Magnetic Soft Microswimmers". In: *Adv. Mater. Technol.* 2 (2017), p. 1700050. DOI: 10.1002/admt.201700050.

[36] K. Jagajjanani Rao et al. "A Force to Be Reckoned With: A Review of Synthetic Microswimmers Powered by Ultrasound". In: *Small* 11 (2015), pp. 2836–2846. DOI: 10.1002/smll.201403621.

[37] Xiaolei Peng et al. "Opto-thermoelectric microswimmers". In: *Light Sci Appl* 9 (2020), p. 141. DOI: 10.1038/s41377-020-00378-5.

[38] Alexandre Morin et al. "Distortion and destruction of colloidal flocks in disordered environments". In: *Nature Phys* 13 (2017), pp. 63–67. DOI: 10.1038/nphys3903.

[39] Kilian Dietrich et al. "Microscale Marangoni Surfers". In: *Phys. Rev. Lett.* 125 (2020), p. 098001. DOI: 10.1103/PhysRevLett.125.098001.

[40] Sijia Wang and Ning Wu. "Selecting the Swimming Mechanisms of Colloidal Particles: Bubble Propulsion versus Self-Diffusiophoresis". In: *Langmuir* 30 (2014), pp. 3477–3486. DOI: 10.1021/la500182f.

[41] Chenyu Jin, Carsten Krüger, and Corinna C. Maass. "Chemotaxis and autochemotaxis of self-propelling droplet swimmers". In: *PNAS* 114 (2017), pp. 5089–5094. DOI: 10.1073/pnas.1619783114.

[42] Ramin Golestanian, Tanniemola B. Liverpool, and Armand Ajdari. "Propulsion of a Molecular Machine by Asymmetric Distribution of Reaction Products". In: *Phys. Rev. Lett.* 94 (2005), p. 220801. DOI: 10.1103/PhysRevLett.94.220801.

[43] Wei Gao et al. "Organized Self-Assembly of Janus Micromotors with Hydrophobic Hemispheres". In: *J. Am. Chem. Soc.* 135 (2013), pp. 998–1001. DOI: 10.1021/ja311455k.

[44] I. Theurkauff et al. "Dynamic Clustering in Active Colloidal Suspensions with Chemical Signaling". In: *Phys. Rev. Lett.* 108 (2012), p. 268303. DOI: 10.1103/PhysRevLett.108.268303.

[45] Songbo Ni et al. "Hybrid colloidal microswimmers through sequential capillary assembly". In: *Soft Matter* 13 (2017), pp. 4252–4259. DOI: 10.1039/C7SM00443E.

[46] Jizhuang Wang et al. "Light-Driven Micro/Nanomotor for Promising Biomedical Tools: Principle, Challenge, and Prospect". In: *Acc. Chem. Res* 51 (2018), pp. 1957–1965. DOI: 10.1021/acs.accounts.8b00254.

[47] Renfeng Dong et al. "Photocatalytic Micro/Nanomotors: From Construction to Applications". In: *Acc. Chem. Res* 51 (2018), pp. 1940–1947. DOI: 10.1021/acs.accounts.8b00249.

[48] S. J. Ebbens. "Active colloids: Progress and challenges towards realising autonomous applications". In: *Current Opinion in Colloid and Interface Science* 26 (2016), pp. 14–23. DOI: 10.1016/j.cocis.2015.10.003.

[49] Wei Wang et al. "From One to Many: Dynamic Assembly and Collective Behavior of Self-Propelled Colloidal Motors". In: *Acc. Chem. Res.* 48 (2015), pp. 1938–1946. DOI: 10.1021/acs.accounts.5b00025.

[50] Jie Zhang et al. "Active colloids with collective mobility status and research opportunities". In: *Chem. Soc. Rev.* 46 (2017), p. 5551. DOI: 10.1039/c7cs00461c.

[51] Tania Patino et al. "Fundamental Aspects of Enzyme-Powered Micro- and Nanoswimmers". In: *Acc. Chem. Res.* 51 (2018), pp. 2662–2671. DOI: 10.1021/acs.accounts.8b00288.

[52] Pierre Illien, Ramin Golestanian, and Ayusman Sen. "'Fuelled' motion: phoretic motility and collective behaviour of active colloids". In: *Chem. Soc. Rev.* 46 (2017), p. 5508. DOI: 10.1039/c7cs00087a.

[53] Yang Wang et al. "Bipolar Electrochemical Mechanism for the Propulsion of Catalytic Nanomotors in Hydrogen Peroxide Solutions". In: *Langmuir* 22 (2006), pp. 10451–10456. DOI: 10.1021/la0615950.

[54] Stephen J. Ebbens and David Alexander Gregory. "Catalytic Janus Colloids: Controlling Trajectories of Chemical Microswimmers". In: *Acc. Chem. Res.* 51 (2018), pp. 1931–1939. DOI: 10.1021/acs.accounts.8b00243.

[55] Richard J. Archer et al. "A Pickering Emulsion Route to Swimming Active Janus Colloids". In: *Adv. Sci.* 5 (2017), p. 1700528. DOI: 10.1002/advs.201700528.

[56] Manoj Manjare et al. "Hydrophobic catalytic Janus motors: Slip boundary condition and enhanced catalytic reaction rate". In: *Applied Physics Letters* 104 (2014), p. 054102. DOI: https://doi.org/10.1063/1.4863952.

[57] Brooke W. Longbottom and Stefan A. F. Bon. "Improving the engine power of a catalytic Janus-sphere micromotor by roughening its surface". In: *Scientific Reports* 8 (2018), p. 4622. DOI: 10.1038/s41598-018-22917-2.

[58] Stephen Ebbens et al. "Size dependence of the propulsion velocity for catalytic Janus-sphere swimmers". In: *Phys. Rev. E* 85 (2012), p. 020401. DOI: 10.1103/PhysRevE.85.020401.

[59] Sambeeta Das et al. "Boundaries can steer active Janus spheres". In: *Nat. Commun.* 6 (2015), p. 8999. DOI: 10.1038/ncomms9999.

[60] Juliane Simmchen et al. "Topographical pathways guide chemical microswimmers". In: *Nat. Commun.* 7 (2016), p. 10598. DOI: 10.1038/ncomms10598.

[61] Aidan T. Brown et al. "Swimming in a crystal". In: *Soft Matter* 12 (2016), pp. 131–140. DOI: 10.1039/c5sm01831e.

[62] Ming You et al. "Intelligent Micro/nanomotors with Taxis". In: *Acc. Chem. Res* 51 (2018), pp. 3006–3014. DOI: 10.1021/acs.accounts.8b00291.

[63] John L. Anderson. "COLLOID TRANSPORT BY INTERFACIAL FORCES". In: *Ann. Rev. Fluid Mech.* 21 (1989), pp. 61–99. DOI: 10.1146/annurev.fl.21.010189.000425.

[64] Jeffrey L. Moran and Jonathan D. Posner. "Phoretic Self-Propulsion". In: *Annu. Rev. Fluid Mech.* 49 (2017), pp. 511–540. DOI: 10.1146/annurev-fluid-122414-034456.

[65] Richard A. Archer et al. "Motion of a particle generated by chemical gradients Part 1. Non-electrolytes". In: *J. Fluid Mech.* 117 (1982), pp. 107–121. DOI: 10.1017/S0022112082001542.

[66] J. F. Brady. "Particle motion driven by solute gradients with application to autonomous motion: continuum and colloidal perspectives". In: *J. Fluid Mech.* 667 (2011), pp. 216–259. DOI: 10.1017/S0022112010004404.

[67] Sébastien Michelin and Eric Lauga. "Phoretic self-propulsion at finite Péclet numbers". In: *J. Fluid Mech.* 747 (2014), pp. 572–604. DOI: 10.1017/jfm.2014.158.

[68] R Golestanian, T B Liverpool, and A Ajdari. "Designing phoretic micro- and nano-swimmers". In: *New J. Phys.* 9 (2007), p. 126. DOI: 10.1088/1367-2630/9/5/126.

[69] Howard A. Stone and Aravinthan D. T. Samuel. "Propulsion of Microorganisms by Surface Distortions". In: *Phys. Rev. Lett.* 77 (1996), p. 4102. DOI: 10.1103/PhysRevLett.77.4102.

[70] Kun-Chun Lee and Andrea J. Liu. "New Proposed Mechanism of Actin-Polymerization-Driven Motility". In: *Biophysical Journal* 95 (2008), pp. 4529–4539. DOI: 10.1529/biophysj.108.134783.

[71] Richard P. Sear. "Diffusiophoresis in Cells: A General Nonequilibrium, Nonmotor Mechanism for the Metabolism-Dependent Transport of Particles in Cells". In: *Phys. Rev. Lett.* 122 (2019), p. 128101. DOI: 10.1103/PhysRevLett.122.128101.

[72] Alexandra E. Frankel and Aditya S. Khair. "Dynamics of a self-diffusiophoretic particle in shear flow". In: *Phys. Rev. E* 90 (2014), p. 013030. DOI: 10.1103/PhysRevE.90.013030.

[73] Nima Sharifi-Mood, Joel Koplik, and Charles Maldarelli. "Diffusiophoretic self-propulsion of colloids driven by a surface reaction: The sub-micron particle regime for exponential and van der Waals interactions". In: *Physics of Fluids* 25 (2013), p. 012001. DOI: 10.1063/1.4772978.

[74] Aidan T. Brown et al. "Ionic screening and dissociation are crucial for understanding chemical self-propulsion in polar solvents". In: *Soft Matter* 13 (2017), pp. 1200–1222. DOI: 10.1039/c6sm01867j.

[75] Aidan Brown and Wilson Poon. "Ionic effects in self-propelled Pt-coated Janus swimmers". In: *Soft Matter* 10 (2014), pp. 4016–4027. DOI: 10.1039/c4sm00340c.

[76] S. Ebbens et al. "Electrokinetic effects in catalytic platinum-insulator Janus swimmers". In: *EPL* 106 (2014), p. 58003. DOI: 10.1209/0295-5075/106/58003.

[77] Philip M. Wheat et al. "Rapid Fabrication of Bimetallic Spherical Motors". In: *Langmuir* 26 (2010), pp. 13052–13055. DOI: 10.1021/la102218w.

[78] Jeffrey L. Moran and Jonathan D. Posner. "Role of solution conductivity in reaction induced charge auto-electrophoresis". In: *Physics of Fluids* 26 (2014), p. 042001. DOI: 10.1063/1.4869328.

[79] Elaine Lay Khim Chng, Guanjia Zhao, and Martin Pumera. "Towards biocompatible nano/microscale machines: self-propelled catalytic nanomotors not exhibiting acute toxicity". In: *Nanoscale* 6 (2014), p. 2119. DOI: 10.1039/c3nr04997c.

[80] Richard A. Archer et al. "pH-Responsive Catalytic Janus Motors with Autonomous Navigation and Cargo-Release Functions". In: *Adv. Funct. Mater.* 30 (2020), p. 2000324. DOI: 10.1002/adfm.202000324.

[81] Stephen J. Ebbens and Jonathan R. Howse. "Direct Observation of the Direction of Motion for Spherical Catalytic Swimmers". In: *Langmuir* 27 (2011), pp. 12293–12296. DOI: 10.1021/la2033127.

[82] R. J. Archer, A. I. Campbell, and S. J. Ebbens. "Glancing angle metal evaporation synthesis of catalytic swimming Janus colloids with well defined angular velocity". In: *Soft Matter* 11 (2015), p. 6872. DOI: 10.1039/c5sm01323b.

[83] Stephen Ebbens et al. “Self-assembled autonomous runners and tumblers”. In: *Phys. Rev. E* 82 (2010), 015304(R). DOI: 10.1103/PhysRevE.82.015304.

[84] Felix Kümmel et al. “Circular Motion of Asymmetric Self-Propelling Particles”. In: *Phys. Rev. Lett.* 110 (2013), p. 198302. DOI: 10.1103/PhysRevLett.110.198302.

[85] Dugyala Venkateshwar Rao et al. “Self-propulsion of bent bimetallic Janus rods”. In: *J. Phys. D: Appl. Phys.* 52 (2018), p. 014002. DOI: 10.1088/1361-6463/aae6f6.

[86] Onajite Shemi and Michael J. Solomon. “Self-Propulsion and Active Motion of Janus Ellipsoids”. In: *Phys. Chem. B* 122 (2018), pp. 10247–10255. DOI: 10.1021/acs.jpcb.8b08303.

[87] Yogesh Shelke et al. “Transition from Linear to Circular Motion in Active Spherical-Cap Colloids”. In: *Langmuir* 35 (2019), pp. 4718–4725. DOI: 10.1021/acs.langmuir.9b00081.

[88] R. P. Doherty et al. “Catalytically propelled 3D printed colloidal microswimmers”. In: *Soft Matter* 16 (2020), p. 10463. DOI: 10.1039/D0SM01320J.

[89] Yahaya Ibrahim, Ramin Golestanian, and Tanniemola B. Liverpool. “Multiple phoretic mechanisms in the self-propulsion of a Pt-insulator Janus swimmer”. In: *J. Fluid Mech.* 828 (2017), pp. 318–352. DOI: 10.1017/jfm.2017.502.

[90] Willow R. DiLuzio et al. “Escherichia coli swim on the right-hand side”. In: *Nature* 435 (2005), pp. 1271–1274. DOI: 10.1038/nature03660.

[91] Eric Lauga et al. “Swimming in Circles: Motion of Bacteria near Solid Boundaries”. In: *Biophysical Journal* 90 (2006), pp. 400–412. DOI: 10.1529/biophysj.105.069401.

[92] Laurence Lemelle et al. “Counterclockwise Circular Motion of Bacteria Swimming at the Air-Liquid Interface”. In: *JOURNAL OF BACTERIOLOGY* 192 (2010), pp. 6307–6308. DOI: 10.1128/JB.00397-10.

[93] Diego Lopez and Eric Lauga. “Dynamics of swimming bacteria at complex interfaces”. In: *Physics of Fluids* 26 (2014), p. 071902. DOI: 10.1063/1.4887255.

[94] Hua Ke et al. "Motion Analysis of Self-Propelled Pt-Silica Particles in Hydrogen Peroxide Solutions". In: *J. Phys. Chem. A* 114 (2010), pp. 5462–5467. DOI: 10.1021/jp101193u.

[95] W.E. Uspal et al. "Guiding catalytically active particles with chemically patterned surfaces". In: *Phys. Rev. Lett.* 117 (2016), p. 048002.

[96] M. N. Popescu, S. Dietrich, and G. Oshanin. "Confinement effects on diffusiophoretic self-propellers". In: *J. Chem. Phys.* 130 (2009), p. 194702. DOI: 10.1063/1.3133239.

[97] D. G. Crowdy. "Wall effects on self-diffusiophoretic Janus particles: a theoretical study". In: *J. Fluid Mech.* 735 (2013), pp. 473–498. DOI: 10.1017/jfm.2013.510.

[98] T.-Y. Chiang and D. Velegol. "Localized Electroosmosis (LEO) Induced by Spherical Colloidal Motors". In: *Langmuir* 30 (2014), pp. 2600–2607. DOI: 10.1021/la402262z.

[99] W. E. Uspal et al. "Self-propulsion of a catalytically active particle near a planar wall: from reflection to sliding and hovering". In: *Soft Matter* 11 (2015), pp. 434–438. DOI: 10.1039/c4sm02317j.

[100] Y. Ibrahim and T. B. Liverpool. "The dynamics of a self-phoretic Janus swimmer near a wall". In: *Eur. Phys. Let.* 111 (2015), p. 48008. DOI: 10.1209/0295-5075/111/48008.

[101] Ali Mozaffari et al. "Self-diffusiophoretic colloidal propulsion near a solid boundary". In: *Phys. Fluids* 28 (2016), p. 053107. DOI: 10.1063/1.4948398.

[102] Zaiyi Shen, Alois Würger, and Juho S. Lintuvuori. "Hydrodynamic interaction of a self-propelling particle with a wall. Comparison between an active Janus particle and a squirmer model". In: *Eur. Phys. J. E* 41 (2018), p. 39. DOI: 10.1140/epje/i2018-11649-0.

[103] Wei M. et al. "Catalytic Micromotors Moving Near Polyelectrolyte-Modified Substrates: The Roles of Surface Charges, Morphology, and Released Ions." In: *ACS Appl Mater Interfaces* 10 (2018), pp. 2249–2252. DOI: 10.1021/acsami.7b18399.

[104] J. Palacci et al. "Light-activated self-propelled colloids". In: *Phil. Trans. R. Soc. A* 372 (2014), pp. 2249–2252. DOI: 10.1098/rsta.2013.0372.

[105] A. L. Holterhoff, M. Li, and J. G. Gibbs. "Self-Phoretic Microswimmers Propel at Speeds Dependent upon an Adjacent Surface's Physicochemical Properties". In: *J. Phys. Chem. Let.* 9 (2018), pp. 5023–5028. DOI: 10.1021/acs.jpclett.8b02277.

[106] Clemens Bechinger et al. "Active particles in complex and crowded environments". In: *Rev. Mod. Phys.* 88 (2016), p. 045006. DOI: 10.1103/RevModPhys.88.045006.

[107] David M. Huang et al. "Water Slippage versus Contact Angle: A Quasiuniversal Relationship". In: *Phys. Rev. Lett.* 101 (2008), p. 226101. DOI: 10.1103/PhysRevLett.101.226101.

[108] C. van der Wel et al. "Preparation of Colloidal Organosilica Spheres through Spontaneous Emulsification". In: *Langmuir* 33.33 (2017), pp. 8174–8180. DOI: 10.1021/acs.langmuir.7b01398.

[109] Maciej Lisicki et al. "Swimming eukaryotic microorganisms exhibit a universal speed distribution". In: *eLife* (2019). DOI: 10.7554/eLife.44907.

[110] Xiaolu Wang et al. "Enhanced active motion of Janus colloids at the water surface". In: *Soft Matter* 11 (2015), p. 7376. DOI: 10.1039/C5SM01111F.

[111] Armand Ajdari and Lydéric Bocquet. "Giant Amplification of Interfacially Driven Transport by Hydrodynamic Slip: Diffusio-Osmosis and Beyond". In: *Phys. Rev. Let.* 96 (2006), p. 186102. DOI: 10.1103/PhysRevLett.96.186102.

[112] A. I. Campbell et al. "Experimental Observation of Flow Fields Around Active Janus Spheres". In: *Nature Communications* 10 (2019), p. 3952. DOI: 10.1038/s41467-019-11842-1.

[113] Daisuke Takagi et al. "Dispersion of Self-Propelled Rods Undergoing Fluctuation-Driven Flips". In: *Physical Review Letters* 10 (2013), p. 038301. DOI: 10.1103/PhysRevLett.110.038301.

[114] D. Takagi et al. "Hydrodynamic capture of microswimmers into sphere-bound orbits". In: *Soft Matter* 10 (2014), p. 1784. DOI: 10.1039/c3sm52815d.

[115] Vincent S. J. Craig, Chiara Neto, and David R. M. Williams. "Shear-Dependent Boundary Slip in an Aqueous Newtonian Liquid". In: *Phys. Rev. Lett.* 87 (2001), p. 054504. DOI: 10.1103/PhysRevLett.87.054504.

[116] J. Baudry et al. "Experimental Evidence for a Large Slip Effect at a Nonwetting Fluid-Solid Interface". In: *Langmuir* 17 (2001), pp. 5232–5236. DOI: 10.1021/la0009994.

[117] Bharat Bhushan, Yuliang Wang, and Abdelhamid Maali. "Boundary Slip Study on Hydrophilic, Hydrophobic, and Superhydrophobic Surfaces with Dynamic Atomic Force Microscopy". In: *Langmuir* 25.14 (2009), pp. 8117–8121. DOI: 10.1021/la900612s.

[118] L. Bocquet and J.-L. Barrat. "Flow boundary conditions from nano- to micro-scales". In: *Soft Matter* 3 (2007), pp. 685–693. DOI: 10.1039/b616490k.

[119] R. Pit, H. Hervet, and L. Léger. "Direct Experimental Evidence of Slip in Hexadecane: Solid Interfaces". In: *Phys. Rev. Lett.* 85 (2000), pp. 980–983. DOI: 10.1103/PhysRevLett.85.980.

[120] C. Cottin-Bizonne et al. "Nanorheology: An investigation of the boundary condition at hydrophobic and hydrophilic interfaces". In: *Eur. Phys. J. E* 9 (2002), pp. 47–53. DOI: 10.1140/epje/i2001-10112-9.

[121] Yingxi Zhu and Steve Granick. "Rate-Dependent Slip of Newtonian Liquid at Smooth Surfaces". In: *Phys. Rev. Lett.* 87 (2001), p. 096105. DOI: 10.1103/PhysRevLett.87.096105.

[122] B. Siboulet et al. "Water self-diffusion at the surface of silica glasses: effect of hydrophilic to hydrophobic transition". In: *Molecular Physics* 111 (2013), pp. 3410–3417. DOI: 10.1080/00268976.2013.861084.

[123] M.T. Kezirian. "Hydrodynamics with a wall-slip boundary condition for a particle moving near a plane wall bounding a semi-infinite viscous fluid". PhD thesis. Massachusetts Institute of Technology, 1992.

[124] Ville Jokinen, Pia Suvanto, and Sami Franssila. “Oxygen and nitrogen plasma hydrophilization and hydrophobic recovery of polymers”. In: *BIOMICROFLUIDICS* 6 (2012), p. 016501. DOI: 10.1063/1.3673251.

[125] J.J. Cras et al. “Comparison of chemical cleaning methods of glass in preparation for silanization”. In: *Biosensors and Bioelectronics* 14 (1999), pp. 683–688. DOI: 10.1016/S0956-5663(99)00043-3.

[126] K. Efimenko, W. E. Wallace, and J. Genzer. “Surface Modification of Sylgard-184 Poly(dimethyl siloxane) Networks by Ultraviolet and Ultraviolet/Ozone Treatment”. In: *J. Coll. and Interf. Sci.* 254 (2002), pp. 306–315. DOI: 10.1006/jcis.2002.8594.

[127] A. Oláh, H. Hillborg, and G. J. Vancso. “Hydrophobic recovery of UV/ozone treated poly(dimethylsiloxane): adhesion studies by contact mechanics and mechanism of surface modification”. In: *Applied Surface Science* 239 (2005), pp. 410–423. DOI: 10.1016/j.apsusc.2004.06.005.

[128] A.J. Goldman, R.G. Cox, and H. Brenner. “Slow viscous motion of a sphere parallel to a plane wall-I Motion through a quiescent fluid”. In: *Chem. Eng. Sci.* 22 (1967), p. 637.

[129] P. Sharma, S. Ghosh, and S. Bhattacharya. “A high-precision study of hindered diffusion near a wall”. In: *Appl Phys Let* 97 (2010), p. 104101. DOI: 10.1063/1.3486123.

[130] Chungil Ha, H. D. Ou-Yang, and Hyuk Kyu Pak. “Direct measurements of colloidal hydrodynamics near flat boundaries using oscillating optical tweezers”. In: *Physica A* 392 (2013), pp. 3497–3504. DOI: 10.1016/j.physa.2013.04.014.

[131] M.N. Popescu et al. “Effective Interactions between Chemically Active Colloids and Interfaces”. In: *Acc. Chem. Res.* 51 (2018), p. 2991. DOI: 10.1021/acs.accounts.8b00237.

[132] S.E. Spagnolie and E. Lauga. “Hydrodynamics of self-propulsion near a boundary: predictions and accuracy of far-field approximations”. In: *J. FLuid Mech.* 700 (2012), p. 105. DOI: 10.1017/jfm.2012.101.

[133] J.S. Lintuvuori et al. "Hydrodynamic oscillations and variable swimming speed in squirmers close to repulsive walls". In: *Soft Matter* 12 (2016), p. 7959. DOI: 10.1039/C6SM01353H.

[134] H.J. Keh and S.B. Chen. "Electrophoresis of a colloidal sphere parallel to a dielectric plane". In: *J. Fluid Mech.* 194 (1988), p. 377. DOI: 10.1017/S0022112088003039.

[135] J. C. W. Corbett et al. "Measuring surface zeta potential using phase analysis light scattering in a simple dip cell arrangement". In: *Colloids and Surfaces A: Physicochemical and Engineering Aspects* 396 (2012), pp. 169–176. DOI: 10.1016/j.colsurfa.2011.12.065.

[136] C. van der Wel et al. "Surfactant-free Colloidal Particles with Specific Binding Affinity". In: *Langmuir* 33.38 (2017), pp. 9803–9810. DOI: 10.1021/acs.langmuir.7b02065.

[137] R. Raveendran and M. A. G. Namboothiry. "Surface-Treated Poly(dimethylsiloxane) as a Gate Dielectric in Solution-Processed Organic Field-Effect Transistors". In: *ACS Omega* 3 (2018), pp. 11278–11285. DOI: 10.1021/acsomega.8b01629.

[138] Robert A. Erb. "The wettability of Gold". In: *J. Phys. Chem.* 72 (1968), pp. 2412–2417. DOI: 10.1021/j100853a023.

[139] Mamdouh E. Abdelsalam et al. "Wetting of Regularly Structured Gold Surfaces". In: *Langmuir* 21 (2005), pp. 1753–1757. DOI: 10.1021/la047468q.

[140] Kilian Dietrich et al. "Two-dimensional nature of the active Brownian motion of catalytic microswimmers at solid and liquid interfaces". In: *New J. Phys.* 19 (2017), p. 065008. DOI: 10.1088/1367-2630/aa7126.

[141] Daniel B. Allan et al. *trackpy: Trackpy v0.4.1*. Apr. 2018. DOI: 10.5281/zenodo.1226458. URL: https://doi.org/10.5281/zenodo.1226458.

[142] J. Palacci et al. "Sedimentation and Effective Temperature of Active Colloidal Suspensions". In: *Phys. Rev. Lett.* 105 (2010), p. 088304. DOI: 10.1103/PhysRevLett.105.088304.

[143] Yongan Gu and Dongqing Li. “The ζ-Potential of Glass Surface in Contact with Aqueous Solutions”. In: *Journal of Colloid and Interface Science* 226 (2000), pp. 328–339. DOI: 10.1006/jcis.2000.6827.

[144] A.J.T.M. Mathijssen et al. “Hydrodynamics of micro-swimmers in films”. In: *J. Fluid. Mech.* 806 (2016), p. 35. DOI: 10.1017/jfm.2016.479.

[145] E. Lauga and T.M. Squires. “Brownian motion near a partial-slip boundary: A local probe of the no-slip condition”. In: *Phys. Fluids* 17 (2005), p. 103102. DOI: 10.1063/1.2083748.

[146] H. Loussaief, L. Pasol, and F. Feuillebois. “Motion of a spherical particle in a viscous fluid along a slip wall”. In: *Q. J. Mech. Appl. Math.* 68 (2015), p. 115. DOI: 10.1093/qjmam/hbv001.

[147] M.J. Lighthill. “On the squirming motion of nearly spherical deformable bodies through liquids at very small Reynolds numbers”. In: *Commun. Pure Appl. Math.* 5 (1952), p. 109. DOI: 10.1002/cpa.3160050201.

[148] J.R. Blake. “A spherical envelope approach to ciliary propulsion”. In: *J. Fluid Mech.* 46 (1971), p. 199. DOI: 10.1017/S002211207100048X.

[149] L. Rothschild. “Non-random Distribution of Bull Spermatozoa in a Drop of Sperm Suspension”. In: *Nature* 198 (1963), pp. 1221–1222. DOI: 10.1038/1981221a0.

[150] Vasily Kantsler et al. “Ciliary contact interactions dominate surface scattering of swimming eukaryotes”. In: *PNAS* 110 (2013), pp. 1187–1192. DOI: 10.1073/pnas.1210548110.

[151] Allison P. Berke et al. “Hydrodynamic Attraction of Swimming Microorganisms by Surfaces”. In: *Phys. Rev. Lett.* 101 (2008), p. 038102. DOI: 10.1103/PhysRevLett.101.038102.

[152] Hans-Curt Flemming et al. “Biofilms: an emergent form of bacterial life”. In: *Nat Rev Microbiol* 14 (2016), pp. 563–575. DOI: 10.1038/nrmicro.2016.94.

[153] C. Berne, C. K. Ellison, and A. Ducret. “Bacterial adhesion at the single-cell level”. In: *Nat Rev Microbiol* 18 (2016), pp. 616–627. DOI: 10.1038/s41579-018-0057-5.

[154] H. Flemming and S. Wuertz. "Bacteria and archaea on Earth and their abundance in biofilms". In: *Nat Rev Microbiol* 17 (2019), pp. 247–260. DOI: 10.1038/s41579-019-0158-9.

[155] Stefania Ketzetzi et al. "Slip Length Dependent Propulsion Speed of Catalytic Colloidal Swimmers near Walls". In: *Phys. Rev. Lett.* 124 (2020), p. 048002. DOI: 10.1103/PhysRevLett.124.048002.

[156] Mojdeh Heidari et al. "Self-Propulsion of Janus Particles near a Brush-Functionalized Substrate". In: *Langmuir* 36.27 (2020), pp. 7775–7780. DOI: 10.1021/acs.langmuir.0c00461.

[157] Stefania Ketzetzi, Joost de Graaf, and Daniela J. Kraft. "Diffusion-Based Height Analysis Reveals Robust Microswimmer-Wall Separation". In: *Phys. Rev. Lett.* 125 (2020), p. 238001. DOI: 10.1103/PhysRevLett.125.238001.

[158] W. E. Uspal et al. "Rheotaxis of spherical active particles near a planar wall". In: *Soft Matter* 11 (2015), pp. 6613–6632. DOI: 10.1039/c5sm01088h.

[159] M. Kuron et al. "Hydrodynamic mobility reversal of squirmers near flat and curved surfaces". In: *Soft Matter* 15 (2019), p. 5908.

[160] Sang-Hyuk Lee et al. "Characterizing and tracking single colloidal particles with video holographic microscopy". In: *Opt. Express* 15 (2007), pp. 18275–18282. DOI: 10.1364/OE.15.018275.

[161] Anna Wang et al. "Using the discrete dipole approximation and holographic microscopy to measure rotational dynamics of non-spherical colloidal particles". In: *Journal of Quantitative Spectroscopy and Radiative Transfer* 146 (2014), pp. 499–509. DOI: 10.1016/j.jqsrt.2013.12.019.

[162] Murray A. Brown and E. J. Staples. "Measurement of absolute particle-surface separation using total internal reflection microscopy and radiation pressure forces". In: *Langmuir* 6 (1990), pp. 1260–1265. DOI: 10.1021/la00097a012.

[163] Hilding Faxén. *Einwirkung der Gefässwände auf den Widerstand gegen die Bewegung einer kleinen Kugel in einer zähen Flüssigkeit*. Uppsala Universitet, 1921.

[164] Carl Wilhelm Oseen. “Neuere methoden und ergebnisse in der hydrodynamik”. In: *Leipzig: Akademische Verlagsgesellschaft mb H.* (1927).

[165] Michael E O’Neill. “A slow motion of viscous liquid caused by a slowly moving solid sphere”. In: *Mathematika* 11.1 (1964), pp. 67–74.

[166] S.G. Flicker and S.G. Bike. “Measuring double layer repulsion using total internal reflection microscopy”. In: *Langmuir* 9.1 (1993), pp. 257–262. DOI: 10.1021/la00025a049.

[167] Aidin Rashidi and Christopher L Wirth. “Motion of a Janus particle very near a wall”. In: *Journal of chemical physics* 147 (2017), p. 224906. DOI: 10.1063/1.4994843.

[168] Ruben W. Verweij et al. “Height distribution and orientation of colloidal dumbbells near a wall”. In: *Phys. Rev. E* 102 (2020), p. 062608. DOI: 10.1103/PhysRevE.102.062608.

[169] Lou Coury. “Conductance Measurements Part 1: Theory”. In: *Current Separations and Drug Development, Bioanalytical Systems* 18.3 (1999), pp. 91–96.

[170] D.C. Henry. “The cataphoresis of suspended particles. Part I.-The equation of cataphoresis”. In: *Proc. R. Soc. London Ser. A* 133 (1931), p. 106.

[171] Joost de Graaf et al. “The raspberry model for hydrodynamic interactions revisited. II. The effect of confinement”. In: *The Journal of chemical physics* 143.8 (2015), p. 084108. DOI: 10.1063/1.4928503.

[172] Shaltiel Eloul et al. “Reactive Momentum Transfer Contributes to the Self-Propulsion of Janus Particles”. In: *Phys. Rev. Lett.* 124 (2020), p. 188001. DOI: 10.1103/PhysRevLett.124.188001.

[173] C. Zhou et al. “Photochemically powered AgCl Janus micromotors as a model system to understand ionic self-diffusiophoresis”. In: *Langmuir* 34 (2018), p. 3289.

[174] Harry Moore et al. “Exceptional sperm cooperation in the wood mouse”. In: *Nature* 418 (2002), pp. 174–177. DOI: 10.1038/nature00832.

[175] Cristian A. Solari, John O. Kessler, and Raymond E. Goldstein. “Motility, mixing, and multicellularity”. In: *Genet Program Evolvable Mach* 8 (2007), pp. 115–129. DOI: 10.1007/s10710-007-9029-7.

[176] Marco Archetti and Kenneth J. Pienta. “Cooperation among cancer cells: applying game theory to cancer”. In: *Nat Rev Cancer* 19 (2019), pp. 110–117. DOI: 10.1038/s41568-018-0083-7.

[177] Calvin K. Lee et al. “Social Cooperativity of Bacteria during Reversible Surface Attachment in Young Biofilms: a Quantitative Comparison of Pseudomonas aeruginosa PA14 and PAO1”. In: *mBio* 11 (2020). DOI: 10.1128/mBio.02644-19.

[178] André Luis Souza dos Santos et al. “What are the advantages of living in a community? A microbial biofilm perspective!” In: *Mem Inst Oswaldo Cruz* 113 (2018), e180212. DOI: 10.1590/0074-02760180212.

[179] Luanne Hall-Stoodley, J. William Costerton, and Paul Stoodley. “Bacterial biofilms: from the Natural environment to infectious diseases”. In: *Nat Rev Microbiol* 2 (2004), pp. 95–108. DOI: 10.1038/nrmicro821.

[180] Avraham Be’er and Gil Ariel. “A statistical physics view of swarming bacteria”. In: *Mov Ecol* 7 (2019), p. 9. DOI: 10.1186/s40462-019-0153-9.

[181] Avraham Be’er et al. “A phase diagram for bacterial swarming”. In: *Commun Phys* 3 (2020), p. 66. DOI: 10.1038/s42005-020-0327-1.

[182] Knut Drescher et al. “Fluid dynamics and noise in bacterial cell–cell and cell–surface scattering”. In: *PNAS* 108 (2011), pp. 10940–10945. DOI: 10.1073/pnas.1019079108.

[183] Melissa B. Miller and Bonnie L. Bassler. “Quorum Sensing in Bacteria”. In: *Ann Rev Micro* 55 (2001), pp. 165–199. DOI: 10.1146/annurev.micro.55.1.165.

[184] Jaideep Katuri et al. “Designing Micro- and Nanoswimmers for Specific Applications”. In: *Acc. Chem. Res.* 50.4 (2017), pp. 2–11. DOI: 10.1021/acs.accounts.6b00386.

[185] Hailing Yu et al. “Confined Catalytic Janus Swimmers in a Crowded Channel: Geometry-Driven Rectification Transients and Directional Locking”. In: *Small* 12 (2016), pp. 5882–5890. DOI: 10.1002/smll.201602039.

[186] Chang Liu et al. “Bimetallic Microswimmers Speed Up in Confining Channels”. In: *Phys. Rev. Lett.* 117 (2016), p. 198001. DOI: 10.1103/PhysRevLett.117.198001.

[187] Megan S. Davies Wykes et al. “Guiding microscale swimmers using teardrop-shaped posts”. In: *Soft Matter* 13 (2017), pp. 4681–4688. DOI: 10.1039/C7SM00203C.

[188] J. Katuri et al. “Directed Flow of Micromotors through Alignment Interactions with Micropatterned Ratchets”. In: *ACS nano* 12 (2018), pp. 7282–7291. DOI: 10.1021/acsnano.8b03494.

[189] Mite Mijalkov and Giovanni Volpe. “Sorting of chiral microswimmers”. In: *Soft Matter* 9 (2013), pp. 6376–6381. DOI: 10.1039/C3SM27923E.

[190] C. Jin et al. “Fine balance of chemotactic and hydrodynamic torques: When microswimmers orbit a pillar just once”. In: *Phys Rev E* 110 (2020), 040601(R). DOI: 10.1103/PhysRevE.100.040601.

[191] Debora Schamel et al. “Nanopropellers and Their Actuation in Complex Viscoelastic Media”. In: *ACS Nano* 8 (2014), pp. 8794–8801. DOI: 10.1021/nn502360t.

[192] Debora Walker et al. “Enzymatically active biomimetic micropropellers for the penetration of mucin gels”. In: *Sci. Adv.* 1 (2015), e1500501. DOI: 10.1126/sciadv.1500501.

[193] Debabrata Patra et al. “Intelligent, self-powered, drug delivery systems”. In: *Nanoscale* 5 (2013), pp. 1273–1283. DOI: 10.1039/C2NR32600K.

[194] Wei Gao et al. “Artificial Micromotors in the Mouse’s Stomach: A Step toward in Vivo Use of Synthetic Motors”. In: *ACS Nano* 9 (2015), pp. 117–123. DOI: 10.1021/nn507097k.

[195] Miguel García et al. “Micromotor-based lab-on-chip immunoassays”. In: *Current Opinion in Colloid and Interface Science* 5 (2013), pp. 1325–1331. DOI: 10.1039/C2NR32400H.

[196] Laura Restrepo-Pérez et al. "Biofunctionalized self-propelled micromotors as an alternative on-chip concentrating system". In: *Lab on a chip* 14 (2014), p. 2914. DOI: 10.1039/c4lc00439f.

[197] Matan Yah Ben Zion et al. "Multiple-robot drug delivery strategy through coordinated teams of microswimmers". In: *Appl. Phys. Lett.* 105 (2014), p. 083705. DOI: 10.1063/1.4893695.

[198] Ivo Buttinoni et al. "Dynamical Clustering and Phase Separation in Suspensions of Self-Propelled Colloidal Particles". In: *Phys. Rev. Lett.* 110 (2013), p. 238301. DOI: 10.1103/PhysRevLett.110.238301.

[199] Adam Wysocki, Roland G. Winkler, and Gerhard Gompper. "Cooperative motion of active Brownian spheres in three-dimensional dense suspensions". In: *EPL* 105 (2014), p. 48004. DOI: 10.1209/0295-5075/105/48004.

[200] Matan Yah Ben Zion et al. "Cooperation in a fluid swarm of fuel-free micro-swimmers". In: *arXiv:2012.15087* (2021).

[201] Antoine Aubret et al. "Targeted assembly and synchronization of self-spinning microgears". In: *Nature Phys* 14 (2018), pp. 1114–1118. DOI: 10.1038/s41567-018-0227-4.

[202] Zuochen Wang et al. "Active colloidal molecules assembled via selective and directional bonds". In: *Nat Comm* 11 (2020), p. 2670. DOI: 10.1038/s41467-020-16506-z.

[203] Francisca Guzmán-Lastra, Andreas Kaiser, and Hartmut Löwen. "Fission and fusion scenarios for magnetic microswimmer clusters". In: *Nat Commun* 7 (2016), p. 13519. DOI: 10.1038/ncomms13519.

[204] Saverio E. Spagnolie et al. "Geometric capture and escape of a microswimmer colliding with an obstacle". In: *Soft Matter* 11 (2015), p. 3396. DOI: 10.1039/c4sm02785j.

[205] Jennifer E. Curtis and David G. Grier. "Structure of Optical Vortices". In: *Phys. Rev. Lett.* 90 (2003), p. 133901. DOI: 10.1103/PhysRevLett.90.133901.

[206] Michael Reichert and Holger Stark. "Circling particles and drafting in optical vortices". In: *J. Phys.: Condens. Matter* 16 (2004), S4085. DOI: 10.1088/0953-8984/16/38/023.

[207] C. Lutz et al. “Surmounting barriers: The benefit of hydrodynamic interactions”. In: *EPL* 74 (2006), p. 719. DOI: 10.1209/epl/i2006-10017-9.

[208] W E Uspal et al. “Shape-dependent guidance of active Janus particles by chemically patterned surfaces”. In: *New J. Phys.* 20 (2018), p. 015013. DOI: 10.1088/1367-2630/aa9f9f.

[209] Nima Sharifi-Mood, Ali Mozaffari, and Ubaldo M. Córdova-Figueroa. “Pair interaction of catalytically active colloids: from assembly to escape”. In: *J. Fluid Mech.* 798 (2016), p. 910. DOI: 10.1017/jfm.2016.317.

[210] Akhil Varma and Sébastien Michelin. “Modeling chemo-hydrodynamic interactions of phoretic particles: A unified framework”. In: *Phys. Rev. Fluids* 4 (2019), p. 124204. DOI: 10.1103/PhysRevFluids.4.1242047.

[211] Hartmut Löwen. “Colloidal soft matter under external control”. In: *J. Phys.: Condens. Matter* 13.24 (2001), R415–R432.

[212] Shin-Hyun Kim et al. “Biofunctional colloids and their assemblies”. In: *Soft Matter* 6.4 (2010), pp. 1092–1110. DOI: 10.1039/b920611f.

[213] Gaoxiang Wu et al. “Confined Assemblies of Colloidal Particles with Soft Repulsive Interactions”. In: *J. Am. Chem. Soc.* 139.14 (2017), pp. 5095–5101. DOI: 10.1021/jacs.6b12975.

[214] Ming Han, Jonathan K. Whitmer, and Erik Luijten. “Dynamics and structure of colloidal aggregates under microchannel flow”. In: *Soft Matter* 15.4 (2019), pp. 744–751. DOI: 10.1039/c8sm01451e.

[215] Ece Yildiz-Ozturk and Ozlem Yesil-Celiktas. “Diffusion phenomena of cells and biomolecules in microfluidic devices”. In: *Biomicrofluidics* 9.5 (2015), p. 052606.

[216] Hernán Míguez, San Ming Yang, and Geoffrey A. Ozin. “Optical Properties of Colloidal Photonic Crystals Confined in Rectangular Microchannels”. In: *Langmuir* 19.8 (2003), pp. 3479–3485.

[217] Horacio Serna, Eva G. Noya, and Wojciech T. Goźdz´. “The influence of confinement on the structure of colloidal systems with competing interactions”. In: *Soft Matter* 16 (2020), p. 718.

[218] P. Yang et al. “Patterning Porous Oxides within Microchannel Networks”. In: *Adv. Mat.* 13.6 (2001), pp. 427–431.

[219] Ranajit Mondal and Madivala G. Basavaraj. “Patterning of colloids into spirals via confined drying”. In: *Soft Matter* 15.16 (2020), pp. 3753–3761.

[220] Hung-Jen Wu and Michael A. Bevan. “Direct Measurement of Single and Ensemble Average Particle-Surface Potential Energy Profiles”. In: *Langmuir* 21.4 (2005), pp. 1244–1254.

[221] H Lorentz. In: *Adv. Theor. Phys.* 1 (1907), pp. 23–33.

[222] H Faxen. “The resistance against the movement of a rigour sphere in viscous fluids, which is embedded between two parallel layered barriers”. In: *Ann. Phys.* 4 (1922), pp. 79–89.

[223] H Faxen. “Fredholm integral equations of hydrodynamics of liquids I”. In: *Ark. Mat., Astron. Fys.* 18 (1924), pp. 29–32.

[224] H Brenner. “The slow motion of a sphere through a viscous fluid towards a plane surface”. In: *Chem. Eng. Sci.* 16 (1961), pp. 242–251.

[225] Nasser A. Frej and Dennis C. Prieve. “Hindered diffusion of a single sphere very near a wall in a nonuniform force field”. In: *J. Chem. Phys.* 98 (1993), p. 7552. DOI: 10.1063/1.464695.

[226] S. A. Rogers et al. “Rotational Diffusion of Spherical Colloids Close to a Wall”. In: *Phys. Rev. Lett.* 109 (2012), p. 098305. DOI: 10.1103/PhysRevLett.109.098305.

[227] Kai Huang and Izabela Szlufarska. “Effect of interfaces on the nearby Brownian motion”. In: *Nat Commun* 6 (2015), p. 8558. DOI: 10.1038/ncomms9558.

[228] Laurent Lobry and Nicole Ostrowsky. “Diffusion of Brownian particles trapped between two walls: Theory and dynamic-light-scattering measurements”. In: *Phys. Rev. B* 53 (1996), p. 12050. DOI: 10.1103/PhysRevB.53.12050.

[229] Binhua Lin, Jonathan Yu, and Stuart A. Rice. “Direct measurements of constrained Brownian motion of an isolated sphere between two walls”. In: *Phys. Rev. E* 62 (2000), p. 3909. DOI: 10.1103/PhysRevE.62.3909.

[230] E. R. Dufresne, D. Altman, and D. G. Grier. “Brownian dynamics of a sphere between parallel walls”. In: *Europhys. Lett.* 53 (2001), pp. 264–270. DOI: 10.1209/epl/i2001-00147-6.

[231] Thorben Benesch, Sotira Yiacoumi, and Costas Tsouris. “Brownian motion in confinement”. In: *Phys. Rev. E* 68 (2003), p. 021401. DOI: 10.1103/PhysRevE.68.021401.

[232] K Zembrzycki, S Błoński, and T A Kowalewski. “Analysis of wall effect on the process of diffusion of nanoparticles in a microchannel”. In: *J. Phys.: Conf. Ser.* 392 (2012), p. 012014. DOI: 10.1088/1742-6596/392/1/012014.

[233] Simon L. Dettmer et al. “Anisotropic diffusion of spherical particles in closely confining microchannels”. In: *Phys. Rev. E* 89 (2014), p. 062305. DOI: 10.1103/PhysRevE.89.062305.

[234] Pushkar P. Lele et al. “Colloidal diffusion and hydrodynamic screening near boundaries”. In: *Soft Matter* 7 (2011), pp. 6844–6852. DOI: 10.1039/C0SM01466D.

[235] V. N. Michailidou et al. “Dynamics of Concentrated Hard-Sphere Colloids Near a Wall”. In: *Phys. Rev. Lett.* 102 (2009), p. 068302. DOI: 10.1103/PhysRevLett.102.068302.

[236] Raphaël Pesché and Gerhard Nägele. “Stokesian dynamics study of quasi-two-dimensional suspensions confined between two parallel walls”. In: *Phys. Rev. E* 62 (2000), p. 5432. DOI: 10.1103/PhysRevE.62.5432.

[237] Burak Eral et al. “Anisotropic and hindered diffusion of colloidal particles in a closed cylinder”. In: *Langmuir* 22 (2010), pp. 16722–16729. DOI: 10.1021/la102273n.

[238] Bianxiao Cui, Haim Diamant, and Binhua Lin. “Screened Hydrodynamic Interaction in a Narrow Channel”. In: *Phys. Rev. Lett.* 89 (2002), p. 188302. DOI: 10.1103/PhysRevLett.89.188302.

[239] Junwei Wang et al. “Free Energy Landscape of Colloidal Clusters in Spherical Confinement”. In: *ACS Nano* 13 (2019), pp. 9005–9015. DOI: 10.1021/acsnano.9b03039.

[240] John Happel and Howard Brenner. *Low Reynolds number hydrodynamics with special applications to particulate media*. Springer, 1983. DOI: https://doi.org/10.1007/978-94-009-8352-6.

[241] Y. Han et al. "Brownian Motion of an Ellipsoid". In: *Science* 314.5799 (2006), pp. 626–630. DOI: 10.1126/science.1130146.

[242] J. T. Padding and W. J. Briels. "Translational and rotational friction on a colloidal rod near a wall". In: *J. Chem. Phys.* 132.5 (2010), p. 054511. DOI: h10.1063/1.3308649.

[243] Daniela J. Kraft et al. "Brownian motion and the hydrodynamic friction tensor for colloidal particles of complex shape". In: *Phys. Rev. E* 88 (2013), 050301(R). DOI: 10.1103/PhysRevE.88.050301.

[244] Tunrayo Adeleke-Larodo, Pierre Illien, and Ramin Golestanian. "Fluctuation-induced hydrodynamic coupling in an asymmetric, anisotropic dumbbell". In: *The European Physical Journal E* 42.39 (2019), p. 054511. DOI: 10.1140/epje/i2019-11799-5.

[245] Maryam Haghighi et al. "Translational and Rotational Diffusion of Gold Nanorods Near a Wall". In: *J. Chem. Phys.* 139 (2013), p. 064710. DOI: 10.1063/1.4817405.

[246] Maciej Lisicki, Bogdan Cichocki, and Eligiusz Wajnryb. "Near-wall diffusion tensor of an axisymmetric colloidal particle". In: *J. Chem. Phys.* 145 (2016), p. 034904. DOI: 10.1063/1.4958727.

[247] Steven Delong, Florencio Balboa Usabiaga, and Aleksandar Donev. "Brownian dynamics of confined rigid bodies". In: *J. Chem. Phys.* 143 (2015), p. 144107. DOI: 10.1063/1.4932062.

[248] Miguel X. Fernandes and José Garciá de la Torre. "Brownian Dynamics Simulation of Rigid Particles of Arbitrary Shape in External Fields". In: *Biophys J* 83.6 (2002), pp. 3039–3048. DOI: 10.1016/S0006-3495(02)75309-5.

[249] Mauricio D. Carbajal-Tinoco, Ricardo Lopez-Fernandez, and José Luis Arauz-Lara. "Asymmetry in Colloidal Diffusion near a Rigid Wall". In: *Phys. Rev. Lett.* 99 (2007), p. 138303. DOI: 10.1103/PhysRevLett.99.138303.

[250] J. Leach et al. "Comparison of Faxén' s correction for a microsphere translating or rotating near a surface". In: *Phys. Rev. E* 79 (2009), p. 026301. DOI: 10.1103/PhysRevE.79.026301.

[251] Sylvia Jeney et al. “Anisotropic Memory Effects in Confined Colloidal Diffusion”. In: *Phys. Rev. Lett.* 100 (2008), p. 240604. DOI: 10.1103/PhysRevLett.100.240604.

[252] Erik Schäffer, Simon F Nørrelykke, and Jonathon Howard. “Surface Forces and Drag Coefficients of Microspheres Near a Plane Surface Measured With Optical Tweezers”. In: *Langmuir* 23 (2007), p. 3654. DOI: 10.1021/la0622368.

[253] N. Garnier and N. Ostrowsky. “Brownian dynamics in a confined geometry. Experiments and numerical simulations”. In: *J. Phys. II* 1 (1991), pp. 1221–1232. DOI: 10.1051/jp2:1991129.

[254] Peter Holmqvist, Jan K G Dhont, and Peter R Lang. “Colloidal Dynamics Near a Wall Studied by Evanescent Wave Light Scattering: Experimental and Theoretical Improvements and Methodological Limitations”. In: *J. Chem. Phys.* 126 (2007), p. 044707. DOI: 10.1063/1.2431175.

[255] Toshiharu Watarai and Toshiaki Iwai. “Direct observation of submicron Brownian particles at a solid-liquid interface by extremely low coherence dynamic light scattering”. In: *Appl. Phys. Express* 7 (2014), p. 032502. DOI: 10.7567/APEX.7.032502.

[256] M. I. M. Feitosa and O. N. Mesquita. “Wall-drag effect on diffusion of colloidal particles near surfaces: A photon correlation study”. In: *Phys. Rev. A* 44 (1991), p. 6677. DOI: 10.1103/PhysRevA.44.6677.

[257] K. H. Lan, N. Ostrowsky, and D. Sornette. “Brownian dynamics close to a wall studied by photon correlation spectroscopy from an evanescent wave”. In: *Phys. Rev. Lett.* 57 (1986), p. 17. DOI: 10.1103/PhysRevLett.57.17.

[258] Peter Holmqvist, Jan K. G. Dhont, and Peter R. Lang. “Anisotropy of Brownian motion caused only by hydrodynamic interaction with a wall”. In: *Phys. Rev. E* 74 (2006), p. 021402. DOI: 10.1103/PhysRevE.74.021402.

[259] Maciej Lisicki et al. “Translational and rotational near-wall diffusion of spherical colloids studied by evanescent wave scattering”. In: *Soft Matter* 10 (2014), pp. 4312–4323. DOI: 10.1039/C4SM00148F.

[260] Yutaka Kazoe and Minami Yoda. "Measurements of the near-wall hindered diffusion of colloidal particles in the presence of an electric field". In: *Appl. Phys. Lett.* 99 (2011), p. 124104. DOI: 10.1063/1.3643136.

[261] D.C. Prieve. "Measurement of colloidal forces with TIRM". In: *Adv. Colloid Interface Sci.* 82 (1999), pp. 93–125. DOI: 10.1016/S0001-8686(99)00012-3.

[262] Giovanni Volpe et al. "Novel perspectives for the application of total internal reflection microscopy". In: *Opt. Express* 17 (2009), pp. 23975–23985. DOI: 10.1364/OE.17.023975.

[263] Lulu Liu et al. "Absolute position total internal reflection microscopy with an optical tweezer". In: *PNAS* 111 (2014), E5609–E5615. DOI: 10.1073/pnas.1422178112.

[264] Lisa Dixon, Fook Chiong Cheong, and David G. Grier. "Holographic deconvolution microscopy for high-resolution particle tracking". In: *Opt. Express* 19 (2011), p. 16410. DOI: 10.1364/OE.19.016410.

[265] Dan S. Bolintineanu et al. "Particle dynamics modeling methods for colloid suspensions". In: *Computational Particle Mechanics* 1 (2014), pp. 321–356.

[266] Christine Middleton et al. "Optimizing the Synthesis of Monodisperse Colloidal Spheres Using Holographic Particle Characterization". In: *Langmuir* 35 (2019), pp. 6602–6609. DOI: 10.1021/acs.langmuir.9b00012.

[267] Jorge Garcia-Sucerquia et al. "Digital in-line holographic microscopy". In: *Appl. Opt.* 45 (2006), p. 836. DOI: 10.1364/AO.45.000836.

[268] Pierre Marquet et al. "Digital holographic microscopy: a noninvasive contrast imaging technique allowing quantitative visualization of living cells with subwavelength axial accuracy". In: *Opt. Lett.* 30 (2005), pp. 468–470. DOI: 10.1364/OL.30.000468.

[269] Camila B Giuliano, Rongjing Zhang, and Laurence G Wilson. "Digital Inline Holographic Microscopy (DIHM) of Weakly-Scattering Subjects". In: *J Vis Exp.* 84 (2014), e50488. DOI: 10.3791/50488.

[270] Wenbo Xu et al. "Digital in-line holography for biological applications". In: *PNAS* 98 (2001), pp. 11301–11305. DOI: 10.1073/pnas.191361398.

[271] Lauren E. Altman and David G. Grier. "CATCH: Characterizing and Tracking Colloids Holographically Using Deep Neural Networks". In: *J. Phys. Chem. B* 124 (2020), pp. 1602–1610. DOI: 10.1021/acs.jpcb.9b10463.

[272] J.H. Zhang et al. "Preparation of monodisperse silica particles with controllable size and shape". In: *J. Mater. Res.* 18.3 (2003), pp. 649–653. DOI: 10.1557/JMR.2003.0085.

[273] W. S. Rasband. "ImageJ". In: *U. S. National Institutes of Health* (1997-2018). URL: https://imagej.nih.gov/ij/.

[274] Solomon Barkley et al. *Holographic Microscopy with Python and HoloPy*. 2018. arXiv: 1806.00058 [eess.IV].

[275] Daniel W. Mackowski and Michael I. Mishchenko. "Calculation of the T matrix and the scattering matrix for ensembles of spheres". In: *J. Opt. Soc. Am. A* 13.11 (1996), pp. 2266–2278.

[276] Dan Allan et al. *soft-matter/trackpy: Trackpy v0.4.2*. Version v0.4.2. 2019. DOI: 10.5281/zenodo.3492186. URL: https://doi.org/10.5281/zenodo.3492186.

[277] John C. Crocker and David G. Grier. "Methods of Digital Video Microscopy for Colloidal Studies". In: *Journal of Colloid and Interface Science* 179.1 (1996), pp. 298–310. DOI: 10.1006/jcis.1996.0217.

[278] Jacob N Israelachvili. *Intermolecular and surface forces*. Academic press, 2011.

[279] Raphael Wittkowski and Hartmut Löwen. "Self-propelled Brownian spinning top: Dynamics of a biaxial swimmer at low Reynolds numbers". In: *Phys. Rev. E* 85 (2012), p. 021406. DOI: 10.1103/PhysRevE.85.021406.

[280] Hartmut Löwen. "Chirality in microswimmer motion: From circle swimmers to active turbulence". In: *Eur. Phys. J. Special Topics* 225 (2016), pp. 2319–2331. DOI: 10.1140/epjst/e2016-60054-6.

[281] Benno Liebchen et al. "Viscotaxis: Microswimmer Navigation in Viscosity Gradients". In: *Phys. Rev. Lett.* 120 (2018), p. 208002. DOI: 10.1103/PhysRevLett.120.208002.

[282] Andreas Zöttl and Holger Stark. "Emergent behavior in active colloids". In: *J. Phys.: Condens. Matter* 28 (2016), p. 253001. DOI: 10.1088/0953-8984/28/25/253001.

[283] Leticia F. Cugliandolo, Pasquale Digregorio Giuseppe Gonnella, and Antonio Suma. "Phase Coexistence in Two-Dimensional Passive and Active Dumbbell Systems". In: *Phys. Rev. Lett.* 119 (2017), p. 268002. DOI: 10.1103/PhysRevLett.119.268002.

[284] Robin van Damme et al. "Interparticle torques suppress motility-induced phase separation for rodlike particles". In: *J. Chem. Phys.* 150 (2019), p. 164501. DOI: 10.1063/1.5086733.

[285] Leonardo F. Valadares et al. "Catalytic Nanomotors: Self-Propelled Sphere Dimers". In: *Small* 6 (2010), pp. 565–572. DOI: 10.1002/smll.200901976.

[286] Jin-Woong Kim, Ryan J. Larsen, and David A. Weitz. "Synthesis of Nonspherical Colloidal Particles with Anisotropic Properties". In: *J. Am. Chem. Soc.* 128 (2006), pp. 14374–14377. DOI: 10.1021/ja065032m.

[287] B. Carrasco and J. Garcia de la Torre. "Improved hydrodynamic interaction in macromolecular bead model". In: *J. Chem. Phys.* 111 (1999), p. 4817. DOI: 10.1063/1.479743.

[288] Vera Meester and Daniela J. Kraft. "Spherical, Dimpled, and Crumpled Hybrid Colloids with Tunable Surface Morphology". In: *Langmuir* 32 (2016), pp. 10668–10677. DOI: 10.1021/acs.langmuir.6b02952.

[289] Daniela J. Kraft et al. "Surface roughness directed self-assembly of patchy particles into colloidal micelles". In: *PNAS* 109 (2012), pp. 10787–10792. DOI: 10.1073/pnas.1116820109.

[290] Babak Vajdi Hokmabad et al. "Topological Stabilization and Dynamics of Self-Propelling Nematic Shells". In: *Phys. Rev. Lett.* 123 (2019), p. 178003. DOI: 10.1103/PhysRevLett.123.178003.

[291] Abraham Savitzky and M. J. E. Golay. "Smoothing and Differentiation of Data by Simplified Least Squares Procedures". In: *Anal. Chem.* 36 (1964), pp. 1627–1639. DOI: 10.1021/ac60214a047.

[292] C. Candan and H. Inan. "A unified framework for derivation and implementation of Savitzky-Golay filters". In: *Signal Processing* 104 (2014), pp. 203–211. DOI: 10.1016/j.sigpro.2014.04.016.

[293] Liqiang Ren, Wei Wang, and Thomas E. Mallouk. "Two Forces Are Better than One: Combining Chemical and Acoustic Propulsion for Enhanced Micromotor Functionality". In: *Acc. Chem. Res.* 51 (2018), pp. 1948–1956. DOI: 10.1021/acs.accounts.8b00248.

[294] Sho C. Takatori et al. "Acoustic trapping of active matter". In: *Nat. Commun.* 7 (2016), p. 10694. DOI: 10.1038/ncomms10694.

[295] Hanumantha Rao Vutukuri et al. "Rational design and dynamics of self-propelled colloidal bead chains: from rotators to flagella". In: *Sci. Rep.* 7 (2017), p. 16758. DOI: 10.1038/s41598-017-16731-5.

[296] Bipul Biswas et al. "Linking Catalyst-Coated Isotropic Colloids into "Active" Flexible Chains Enhances Their Diffusivity". In: *ACS Nano* 11 (2017), pp. 10025–10031. DOI: 10.1021/acsnano.7b04265.

[297] L. Alvarez et al. "Reconfigurable Artificial Microswimmers with Internal Feedback". In: *arXiv:2009.08382* (2020).

[298] Indrani Chakraborty et al. "Colloidal joints with designed motion range and tunable joint flexibility". In: *Nanoscale* 9 (2017), pp. 7814–7821. DOI: 10.1039/C6NR08069C.

[299] Ruben W. Verweij et al. "Flexibility-induced effects in the Brownian motion of colloidal trimers". In: *Phys. Rev. Research* 2 (2020), p. 033136. DOI: 10.1103/PhysRevResearch.2.033136.

[300] Ruben W Verweij et al. "Conformations and diffusion of flexibly linked colloidal chains". In: *JPhys Materials* (2021). DOI: 10.1088/2515-7639/abf571.

[301] Casper van der Wel et al. "Micrometer-sized TPM emulsion droplets with surface-mobile binding groups". In: *J. Phys.: Condens. Matter* 30 (2018), p. 094005. DOI: 10.1088/1361-648X/aaab22.