

- 5 Stock, S. and von, K.,R. (2022). Microgels at droplet interfaces of water-in-oil emulsions - challenges and progress. *Curr. Opin. Colloid Interface Sci.* 58: 101561. <https://doi.org/10.1016/j.cocis.2021.101561>.
- 6 Guzmán, E. and Maestro, A. (2022). Soft colloidal particles at fluid interfaces. *Polymers (Basel)* 14 (6): 1133. <https://doi.org/10.3390/polym14061133>.
- 7 Bharadwaj, S., Niebuur, B.-J., Nothdurft, K. et al. (2022). Cononsolvency of thermoresponsive polymers: where we are now and where we are going. *Soft Matter* 18: 2884–2909. <https://doi.org/10.1039/d2sm00146b>.
- 8 Suzuki, D. (2023). Nanogel/microgel science and beyond. *Langmuir* 39 (22): 7525–7529. <https://doi.org/10.1021/acs.langmuir.3c00560>.
- 9 Pelton, R.H. and Chibante, P. (1986). Preparation of aqueous latices with N-isopropylacrylamide. *Colloids Surf. A Physicochem. Eng. Asp.* 20: 247–256.
- 10 Senff, H. and Richtering, W. (1999). Temperature sensitive microgel suspensions: colloidal phase behavior and rheology of soft spheres. *J. Chem. Phys.* 111: 1705–1711.
- 11 Stieger, M., Pedersen, J.S., Lindner, P., and Richtering, W. (2004). Are thermoresponsive microgels model systems for concentrated colloidal suspensions? A rheology and small-angle neutron scattering study. *Langmuir* 20 (17): 7283–7292.
- 12 Eckert, T. and Richtering, W. (2008). Thermodynamic and hydrodynamic interaction in concentrated microgel suspensions: hard or soft sphere behavior? *J. Chem. Phys.* 129 (12): 124902. <https://doi.org/10.1063/1.2978383>.
- 13 Brijitta, J. and Schurtenberger, P. (2019). Responsive hydrogel colloids: structure, interactions, phase behaviour, and equilibrium and non-equilibrium transitions of microgel dispersions. *Curr. Opin. Colloid Interface Sci.* 40: 87–103. <https://doi.org/10.1016/j.cocis.2019.02.005>.
- 14 Akgonullu, D.Z., Murray, B.S., Connell, S.D. et al. (2023). Synthetic and biopolymeric microgels: review of similarities and difference in behaviour in bulk phases and at interfaces. *Adv. Colloid Interf. Sci.* 320: 102983. <https://doi.org/10.1016/j.cis.2023.102983>.
- 15 Lu, D., Zhu, M., Wu, S. et al. (2020). Programmed multiresponsive hydrogel assemblies with light-tunable mechanical properties, actuation, and fluorescence. *Adv. Funct. Mater.* 30 (11): <https://doi.org/10.1002/adfm.201909359>.
- 16 Hu, C., Xu, W., Conrads, C.M. et al. (2021). Visible light and temperature dual-responsive microgels by crosslinking of spiropyran modified prepolymers. *J. Colloid Interface Sci.* 582 (Pt B): 1075–1084. <https://doi.org/10.1016/j.jcis.2020.08.081>.
- 17 Morozova, S.M., Gevorkian, A., and Kumacheva, E. (2023). Design, characterization and applications of nanocolloidal hydrogels. *Chem. Soc. Rev.* 52 (15): 5317–5339. <https://doi.org/10.1039/d3cs00387f>.
- 18 He, S., Schog, S., Chen, Y. et al. (2023). Photoinduced mechanical cloaking of diarylethene-crosslinked microgels. *Adv. Mater.* 35: e2305845. <https://doi.org/10.1002/adma.202305845>.
- 19 Borrmann, R., Palchyk, V., Pich, A., and Rueping, M. (2018). Reversible switching and recycling of adaptable organic microgel catalysts (microgelzymes) for

- asymmetric organocatalytic desymmetrization. *ACS Catal.* 8 (9): 7991–7996. <https://doi.org/10.1021/acscatal.8b01408>.
- 20 Grabowski, F., Fink, F., Schier, W.S. et al. (2024). Catalyzed henry reaction by compartmentalized copper-pyrazolyl-complex modified microgels. *Adv. Funct. Mater.* <https://doi.org/10.1002/adfm.202403787>.
- 21 Nayak, S., Gan, D.J., Serpe, M.J., and Lyon, L.A. (2005). Hollow thermoresponsive microgels. *Small* 1 (4): 416–421. <https://doi.org/10.1002/sml.200400089>.
- 22 Dubbert, J., Honold, T., Pedersen, J.S. et al. (2014). How hollow are thermoresponsive hollow nanogels? *Macromolecules* 47 (24): 8700–8708. <https://doi.org/10.1021/ma502056y>.
- 23 Hagemans, F., Camerin, F., Hazra, N. et al. (2023). Buckling and interfacial deformation of fluorescent poly(*N*-isopropylacrylamide) microgel capsules. *ACS Nano* 17: 7257. <https://doi.org/10.1021/acsnano.2c10164>.
- 24 Hagemans, F., Hazra, N., Lovasz, V.D. et al. (2024). Soft and deformable thermoresponsive hollow rod-shaped microgels. *Small* e2401376. <https://doi.org/10.1002/sml.202401376>.
- 25 Krueger, A.J.D., Bakirman, O., Guerzoni, L.P.B. et al. (2019). Compartmentalized jet polymerization as a high-resolution process to continuously produce anisometric microgel rods with adjustable size and stiffness. *Adv. Mater.* 31: 1903668. <https://doi.org/10.1002/adma.201903668>.
- 26 Xu, W., Rudov, A., Oppermann, A. et al. (2020). Synthesis of polyampholyte janus-like microgels by coacervation of reactive precursors in precipitation polymerization. *Angew. Chem. Int. Ed.* 59 (3): 1248–1255. <https://doi.org/10.1002/anie.201910450>.
- 27 Janssen, F.A.L., Kather, M., Kröger, L.C. et al. (2017). Synthesis of poly(*N*-vinylcaprolactam)-based microgels by precipitation polymerization: process modeling and experimental validation. *Ind. Eng. Chem. Res.* 56: 14545. <https://doi.org/10.1021/acs.iecr.7b03263>.
- 28 Wolff, H.J.M., Kather, M., Breisig, H. et al. (2018). From batch to continuous precipitation polymerization of thermoresponsive microgels. *ACS Appl. Mater. Interfaces* 10: 24799. <https://doi.org/10.1021/acscami.8b06920>.
- 29 Schneider, S., Jung, F., Mergel, O. et al. (2019). Model-based design and synthesis of ferrocene containing microgels. *Polym. Chem.* 50: 131. <https://doi.org/10.1039/c9py00494g>.
- 30 Kaven, L.F., Schweidtmann, A.M., Keil, J. et al. (2024). Data-driven product-process optimization of *N*-isopropylacrylamide microgel flow-synthesis. *Chem. Eng. J.* 479: 147567. <https://doi.org/10.1016/j.cej.2023.147567>.
- 31 Meyer-Kirschner, J., Kather, M., Ksiazkiewicz, A. et al. (2018). Monitoring microgel synthesis by copolymerization of *N*-isopropylacrylamide and *N*-vinylcaprolactam via in-line Raman spectroscopy and indirect hard modeling. *Macromol. React. Eng.* 12 (3): 1700067. <https://doi.org/10.1002/mren.201700067>.
- 32 Koronaki, E.D., Kaven, L.F., Faust, J.M.M. et al. (2024). Nonlinear manifold learning determines microgel size from Raman spectroscopy. *AICHE J.* <https://doi.org/10.1002/aic.18494>.

- 33 Kather, M., Ritter, F., and Pich, A. (2018). Surfactant-free synthesis of extremely small stimuli-responsive colloidal gels using a confined impinging jet reactor. *Chem. Eng. J.* 344: 375–379. <https://doi.org/10.1016/j.cej.2018.03.082>.
- 34 Scheffold, F. (2020). Pathways and challenges towards a complete characterization of microgels. *Nat. Commun.* 11 (1): 4315. <https://doi.org/10.1038/s41467-020-17774-5>.
- 35 Keidel, R., Ghavami, A., Lugo, D.M. et al. (2018). Time-resolved structural evolution during the collapse of responsive hydrogels: the microgel-to-particle transition. *Sci. Adv.* 4: eaao7086.
- 36 Wrede, O., Reimann, Y., Lülsdorf, S. et al. (2018). Volume phase transition kinetics of smart N-n-propylacrylamide microgels studied by time-resolved pressure jump small angle neutron scattering. *Sci. Rep.* 8 (1): 13781. <https://doi.org/10.1038/s41598-018-31976-4>.
- 37 Bochenek, S., Camerin, F., Zaccarelli, E. et al. (2022). In-situ study of the impact of temperature and architecture on the interfacial structure of microgels. *Nat. Commun.* 13 (1): 3744. <https://doi.org/10.1038/s41467-022-31209-3>.
- 38 Conley, G.M., Aebischer, P., Nöjd, S. et al. (2017). Jamming and overpacking fuzzy microgels: deformation, interpenetration, and compression. *Sci. Adv.* 3 (10): e1700969. <https://doi.org/10.1126/sciadv.1700969>.
- 39 Siemes, E., Nevskiy, O., Sysoiev, D. et al. (2018). Nanoscopic visualization of cross-linking density in polymer networks with diarylethene photoswitches. *Angew. Chem. Int. Ed.* 57: 12280.
- 40 Bergmann, S., Wrede, O., Huser, T., and Hellweg, T. (2018). Super-resolution optical microscopy resolves network morphology of smart colloidal microgels. *Phys. Chem. Chem. Phys.* 20 (7): 5074–5083. <https://doi.org/10.1039/c7cp07648g>.
- 41 Jana, S., Nevskiy, O., Höche, H. et al. (2024). Local water content in polymer gels measured with super-resolved fluorescence lifetime imaging. *Angew. Chem. Int. Ed.* 63: e202318421. <https://doi.org/10.1002/anie.202318421>.
- 42 Nevskiy, O. and Wöll, D. (2023). 3D super-resolution fluorescence imaging of microgels. *Annu. Rev. Phys. Chem.* 74 (1): <https://doi.org/10.1146/annurev-physchem-062422-022601>.
- 43 Azad, R., Lenßen, P., Jia, Y. et al. (2024). Modeling the temperature-dependent size change of polydisperse nano-objects using a deep generative model. *Nano Lett.* 24 (15): 4447–4453. <https://doi.org/10.1021/acs.nanolett.4c00267>.
- 44 Matsui, S., Kureha, T., Hiroshige, S. et al. (2017). Fast adsorption of soft hydrogel microspheres on solid surfaces in aqueous solution. *Angew. Chem. Int. Ed. Engl.* 56 (40): 12146–12149. <https://doi.org/10.1002/anie.201705808>.
- 45 Backes, S. and von Klitzing, R. (2018). Nanomechanics and nanorheology of microgels at interfaces. *Polymers (Basel)* 10 (9): 978. <https://doi.org/10.3390/polym10090978>.
- 46 Scotti, A., Bochenek, S., Brugnoli, M. et al. (2019). Exploring the colloid-to-polymer transition for ultra-low crosslinked microgels from three to two dimensions. *Nat. Commun.* 10 (1): 1418. <https://doi.org/10.1038/s41467-019-09227-5>.

- 47 Schulte, M.F., Bochenek, S., Brugnoli, M. et al. (2021). Stiffness tomography of ultra-soft nanogels by atomic force microscopy. *Angew. Chem. Int. Ed.* 60: 2280. <https://doi.org/10.1002/anie.202011615>.
- 48 Lopez, C.G. and Richtering, W. (2017). Does Flory-Rehner theory quantitatively describe the swelling of thermoresponsive microgels? *Soft Matter* 13 (44): 8271–8280. <https://doi.org/10.1039/c7sm01274h>.
- 49 Lenßen, P., Hengsbach, R., Frommelius, A. et al. (2025). Nanosized core-shell bio-hybrid microgels and their internal structure. *Nanoscale*. <https://doi.org/10.1039/d4nr04677c>.
- 50 Ohshima, H. (2021). Approximate analytic expressions for the electrophoretic mobility of spherical soft particles. *Electrophoresis* 42: 2182–2188.
- 51 Stieger, M., Richtering, W., Pedersen, J.S., and Lindner, P. (2004). Small-angle neutron scattering study of structural changes in temperature sensitive microgel colloids. *J. Chem. Phys.* 120 (13): 6197–6206. <https://doi.org/10.1063/1.1665752>.
- 52 Mohanty, P.S., Nöjd, S., van Gruijthuijsen, K. et al. (2017). Interpenetration of polymeric microgels at ultrahigh densities. *Sci. Rep.* 7 (1): 117. <https://doi.org/10.1038/s41598-017-01471-3>.
- 53 Scotti, A., Denton, A.R., Brugnoli, M. et al. (2019). Deswelling of microgels in crowded suspensions depends on cross-link density and architecture. *Macromolecules* 52: 3995–4007. <https://doi.org/10.1021/acs.macromol.9b00729>.
- 54 Scotti, A., Schulte, M.F., Lopez, C.G. et al. (2022). How softness matters in soft nanogels and nano gel assemblies. *Chem. Rev.* 122: 11675. <https://doi.org/10.1021/acs.chemrev.2c00035>.
- 55 Houston, J.E., Fruhner, L., de la, C.,A. et al. (2022). Resolving the different bulk moduli within individual soft nanogels using small-angle neutron scattering. *Sci. Adv.* 8 (26): eabn6129. <https://doi.org/10.1126/sciadv.abn6129>.
- 56 Hazra, N., Rudov, A.A., Midya, J. et al. (2024). Capillary-driven self-assembly of soft ellipsoidal microgels at the air-water interface. *Proc. Natl. Acad. Sci.* 121 (52): e2403690121. <https://doi.org/10.1073/pnas.2403690121>.
- 57 Welsch, N. and Lyon, L.A. (2017). Oligo(ethylene glycol)-sidechain microgels prepared in absence of cross-linking agent: polymerization, characterization and variation of particle deformability. *PLoS One* 12 (7): e0181369. <https://doi.org/10.1371/journal.pone.0181369>.
- 58 Bachman, H., Brown, A.C., Clarke, K.C. et al. (2015). Ultrasoft, highly deformable microgels. *Soft Matter* 11 (10): 2018–2028. <https://doi.org/10.1039/c5sm00047e>.
- 59 Scotti, A., Houston, J.E., Brugnoli, M. et al. (2020). Phase behavior of ultrasoft spheres show stable Bcc lattices. *Phys. Rev. E* 102 (5): 052602. <https://doi.org/10.1103/physreve.102.052602>.
- 60 Scotti, A., Brugnoli, M., Lopez, C.G. et al. (2020). Flow properties reveal the particle-to-polymer transition of ultra-low crosslinked microgels. *Soft Matter* 16 (3): 668–678. <https://doi.org/10.1039/c9sm01451a>.
- 61 Alberg, I., Kramer, S., Schinnerer, M. et al. (2020). Polymeric nanoparticles with neglectable protein corona. *Small* 16 (18): e1907574. <https://doi.org/10.1002/sml.201907574>.

- 62 Richtering, W., Alberg, I., and Zentel, R. (2020). Nanoparticles in the biological context: surface morphology and protein corona formation. *Small* 16 (39): 2002162. <https://doi.org/10.1002/sml.202002162>.
- 63 Deloney, M., Smart, K., Christiansen, B.A., and Panitch, A. (2020). Thermoresponsive, hollow, degradable core-shell nanoparticles for intra-articular delivery of anti-inflammatory peptide. *J. Control. Release* 323: 47–58.
- 64 Katopodi, T., Petanidis, S., Floros, G. et al. (2024). Hybrid nanogel drug delivery systems: transforming the tumor microenvironment through tumor tissue editing. *Cells* 13 (11): 908. <https://doi.org/10.3390/cells13110908>.
- 65 Boesveld, S., Jans, A., Rommel, D. et al. (2019). Microgels sopping up toxins—GM1a-functionalized microgels as scavengers for cholera toxin. *ACS Appl. Mater. Interfaces* 11: 25017. <https://doi.org/10.1021/acsami.9b06413>.
- 66 Boesveld, S., Kittel, Y., Luo, Y. et al. (2023). Microgels as platforms for antibody-mediated cytokine scavenging. *Adv. Healthc. Mater.* 12: e2300695. <https://doi.org/10.1002/adhm.202300695>.
- 67 Rose, J.C., Gehlen, D.B., Haraszti, T. et al. (2018). Biofunctionalized aligned microgels provide 3D cell guidance to mimic complex tissue matrices. *Biomaterials* 163: 128. <https://doi.org/10.1016/j.biomaterials.2018.02.001>.
- 68 Braunmiller, D.L., Babu, S., Gehlen, D.B. et al. (2022). Pre-programmed rod-shaped microgels to create multi-directional anisogels for 3D tissue engineering. *Adv. Funct. Mater.* 32: 2202430. <https://doi.org/10.1002/adfm.202202430>.

