Short summary on Microgel-MOF sensor for dissolved CO_2

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For a rapid research idea development, we collaborated to explore the integration of metal-organic frameworks (MOFs) into PNIPAM-co-MAA microgels to enhance their functionality for dissolved CO_2 (dCO_2) sensing and capture applications. The microgels were successfully synthesized with MOFs as co-monomers, and their properties were thoroughly characterized. Dynamic light scattering (DLS) and zeta potential measurements confirmed the impact of MOF incorporation on particle size and surface charge. Thermogravimetric analysis (TGA) verified the successful integration of the MOF into the microgel network. The optical response of the microgel-MOF hybrid was evaluated using UV-VIS spectroscopy, demonstrating a clear interaction with dCO_2. Additionally, microgel-MOF-based etalon sensors were developed to study their sensitivity to dCO_2, $NaHCO_3$, Na_2CO_3, and HCl and their stability to dCO_2 was tested over multiple cycles.

These findings highlight the potential of MOF-functionalized microgels as dynamic and responsive materials for CO_2 detection and environmental monitoring. The ability of these hybrid microgels to undergo structural changes in response to dCO_2 suggests promising applications in smart sensing technologies. Future work will focus on refining the microgel-MOF interactions to enhance selectivity and reusability, as well as scaling up production for real-world applications.