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New materials with microgels

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This talk introduces a flexible and straightforward method for generating responsive microgel materials with new structures by using a microfluidic technique. We demonstrate that this approach enables tight control over the size and monodispersity of droplets as well as the interfacial structures, which is essential for determining release and transport kinetics of encapsulated components. We also show that responsiveness of microgel materials is controllable by tuning their structure, thereby allowing us to overcome the limitation of length scales, since the diffusion of water molecules through the structured gel phase is much faster than through a bulk gel phase of similar dimensions. We have generated a variety of novel gel structures: microgels with complex structures, microgel shells, 3D gel network with a truly fast response, and responsive colloidosomes. The robustness and versatility of this approach are expected to generate more complex systems and create new possibilities to develop novel materials in practical applications, including drug delivery, foods, and cosmetics.