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Smart Microgel Based Membranes for Electrochemical Devices and Catalysis

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Smart copolymer microgels based on acrylamides are promising for several applications [1,2] Therefore these systems are intensely studied in recent years. If microgels are made with (photo-)crosslinkable comonomers (secondary crosslinkers), they can be deposited in thin layers and subsequently be cross-linked by irradiation [3,4]. Upon cross-linking freestanding membranes are obtained, which still exhibit the volume phase transition (VPT) of the microgels. The present contribution describes the investigation of such microgels by small angle scattering and also the membrane formation.
The VPT of the obtained 2D materials can be exploited to make membranes which modulate ion flow by changing temperature. This can be used in electrochemical devices. The resistance is found to steeply increase by up to an order of magnitude at the VPT of the original microgels. Hence, these freestanding microgel membranes might be useful for building self-regulating fuel cells. Moreover, they can be doped with metal nanoparticles granting them catalytic activity and allowing to use them in flow reactors or microfluidic cells for chemical conversion [5].

References

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