Smart \( N\text{-}tert \)-butylacrylamide/PNIPAM copolymer microgels: 
Shift of the volume phase transition

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Thermosensitive microgels based on \( N \)-isopropylacrylamide (NIPAM) have received great interest due to their fully reversible volume phase transition (VPT), but pure PolyNIPAM hydrogels are limited to a transition temperature of \(~32°C\) in water. In order to cover a wide temperature range around the VPTT of PolyNIPAM or to induce an additional sensitivity with respect to pH or ionic strength, the monomer NIPAM can be copolymerised with other organic comonomers such as allyl-acetic acid [1] or acrylic acid [2].

In this contribution a systematic series of thermoresponsive copolymer microgel networks made of \( N \)-isopropylacrylamide and \( N\text{-}tert \)-butylacrylamide are presented. Using this more hydrophobic comonomer it is possible to shift the VPTT to higher temperatures only by varying the comonomer content.

For characterisation of the particle shape in the totally collapsed state and their size distribution imaging methods such as transmission and scanning electron microscopy (TEM and SEM) are employed (fig. 1). The thermoresponsive behaviour of these colloids was studied in detail applying scattering techniques like dynamic light scattering (DLS) and small angle neutron scattering (SANS) (fig. 2) [3].

![Fig. 1] SEM images of Poly(NIPAM-co-NtBAM) microgels with different comonomer content (left: 1 mol%, middle: 10 mol%, right: 15 mol%)

![Fig. 2] left: relaxation rate of poly(NIPAM-co-NtBAM) microgels with different comonomer content as function of \( q^2 \); right: SANS profile of poly(NIPAM-co-NtBAM) microgel with 10 mol% comonomer at 15°C and 39.2°C