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# Non-ionic UCST-type polymers: Synthesis and analysis of new thermoresponsive properties in aqueous media

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Thermoresponsive polymers are one of the most intensively studied "smart" materials. Polymers with UCST (Upper Critical Solution Temperature) behavior can be synthesized via free radical polymerization or via controlled polymerization methods like Reversible addition-fragmentation chain transfer (RAFT). Controlled radical polymerization methods offer several advantages in the synthesis of this type of polymers, such as sharp phase transition temperature and low hysteresis. Herein, we focused on the synthesis and characterization of copolymers of acrylamide (AAm) and hydrophobic comonomers e.g. acrylonitrile (AN) and styrene (St). The phase transition temperatures of polymer samples of poly(AAm-co-AN) could be easily tuned, showing an effective phase transition temperature. Further, we studied the chemical and thermoresponsive stability under different conditions, which increased the understanding of non-ionic UCST-type polymers for possible applications under aqueous conditions over long periods of storage. In the case of copolymers of poly(AAm-co-St), the observation of thermoresponsivity was highly dependent upon copolymer composition. Therefore, we provided controlled polymerization reactions of AAm and St up to high conversions via RAFT technique, to induce sharp phase transition temperatures in a range between 50 – 62 °C. However, the same copolymers prepared by conventional free radical polymerization were not UCST responsive, even after synthesis of different St compositions. Thus the controlled polymerization of AAm with hydrophobic non-hydrolysable comonomers offers a clear highlight in the field of thermoresponsive polymers and defines new possible applications.

## Biography

Beatriz A Pineda-Contreras received as DAAD fellow her MSc degree in Chemistry with specialization in macromolecular chemistry from the Marburg University (2012), with a thesis on water-soluble thermoresponsive polymers with UCST behavior. She obtained her Diploma in Chemistry with focus on electrodeposition of Chitosan/Hydroxyapatite composites onto Ti6Al4V. She is working on her PhD since 2013 at the University of Bayreuth under the guidance of Prof. Seema Agarwal on synthesis and application of "smart" materials as polymeric carriers. Her research interests are "smart" polymers, water-soluble thermoresponsive polymers, their synthesis and possible applications.

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