

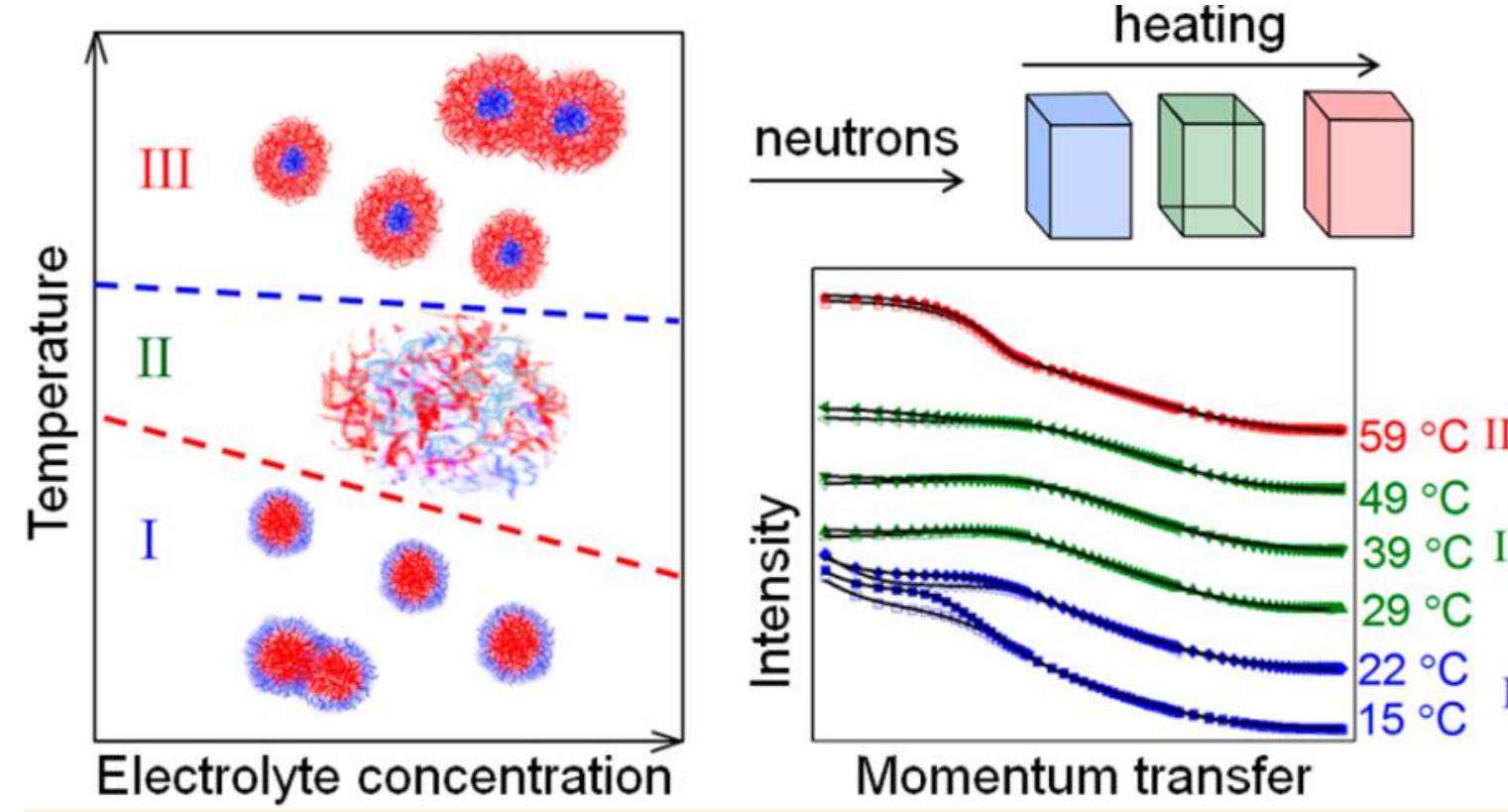
Motivation

- Designing smart polymers for thermo sensors;
- Modeling size controlled nanoparticle precipitation;
- Realizing functional application of smart polymers.

Co-nonsolvency occurs if a mixture of two good solvents causes the collapse or demixing of polymers into a polymer-rich phase in a certain range of compositions of these two solvents. Co-nonsolvency response of Poly(sulfobetaine)-based block copolymer thin films containing the zwitterionic PSBP is newly studied. We focus on the co-nonsolvency behavior of PSBP-*b*-PNIPAM thin films in a series of deuterated binary mixtures.

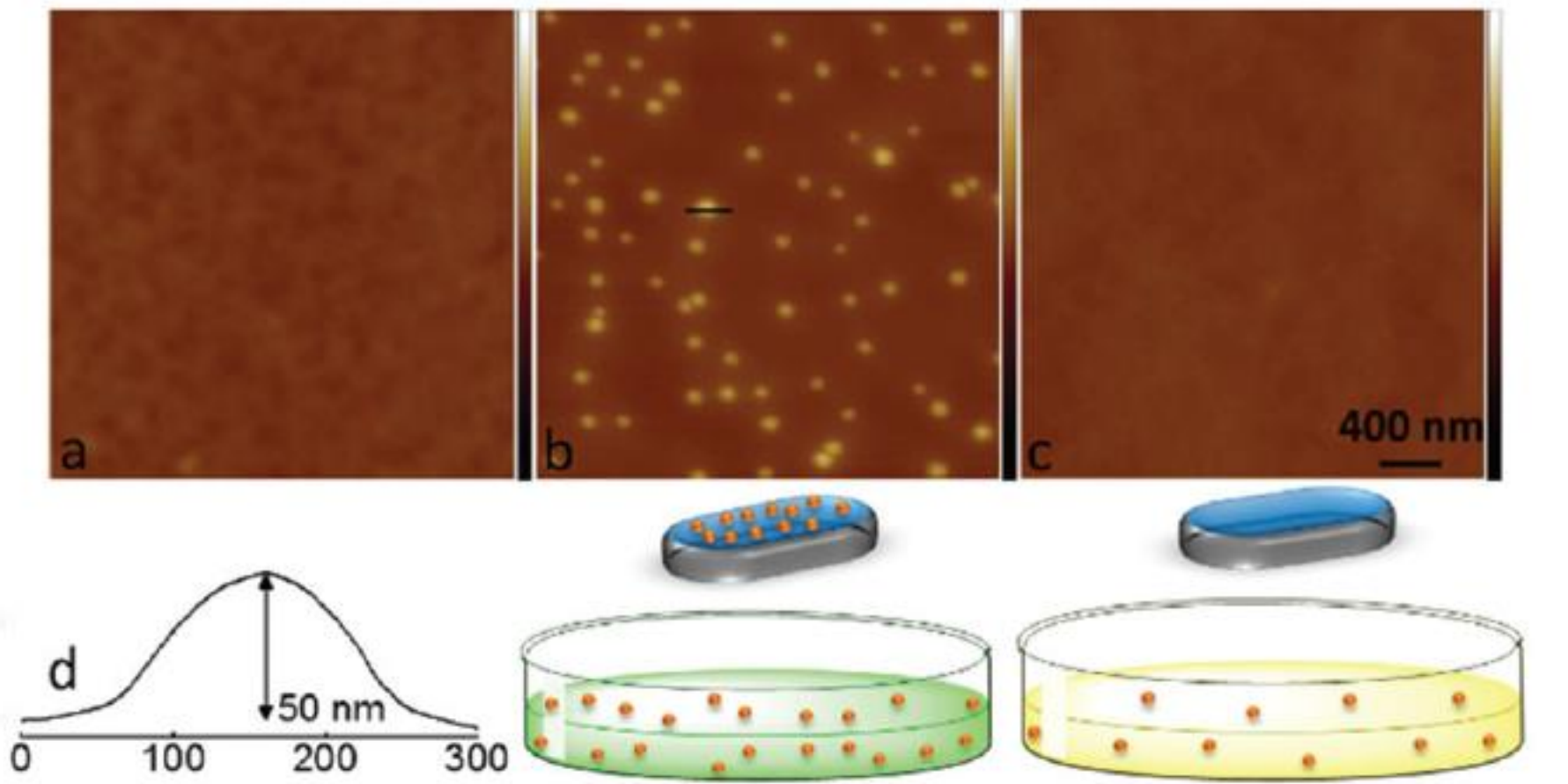
Keßler, S *et al.*, Modeling size controlled nanoparticle precipitation with the co-solvency method by spinodal decomposition. *Soft Matter* **2016**, 12, (34), 7231-7240.

Expected structures of PSBP-*b*-PNIPAM in aqueous solution



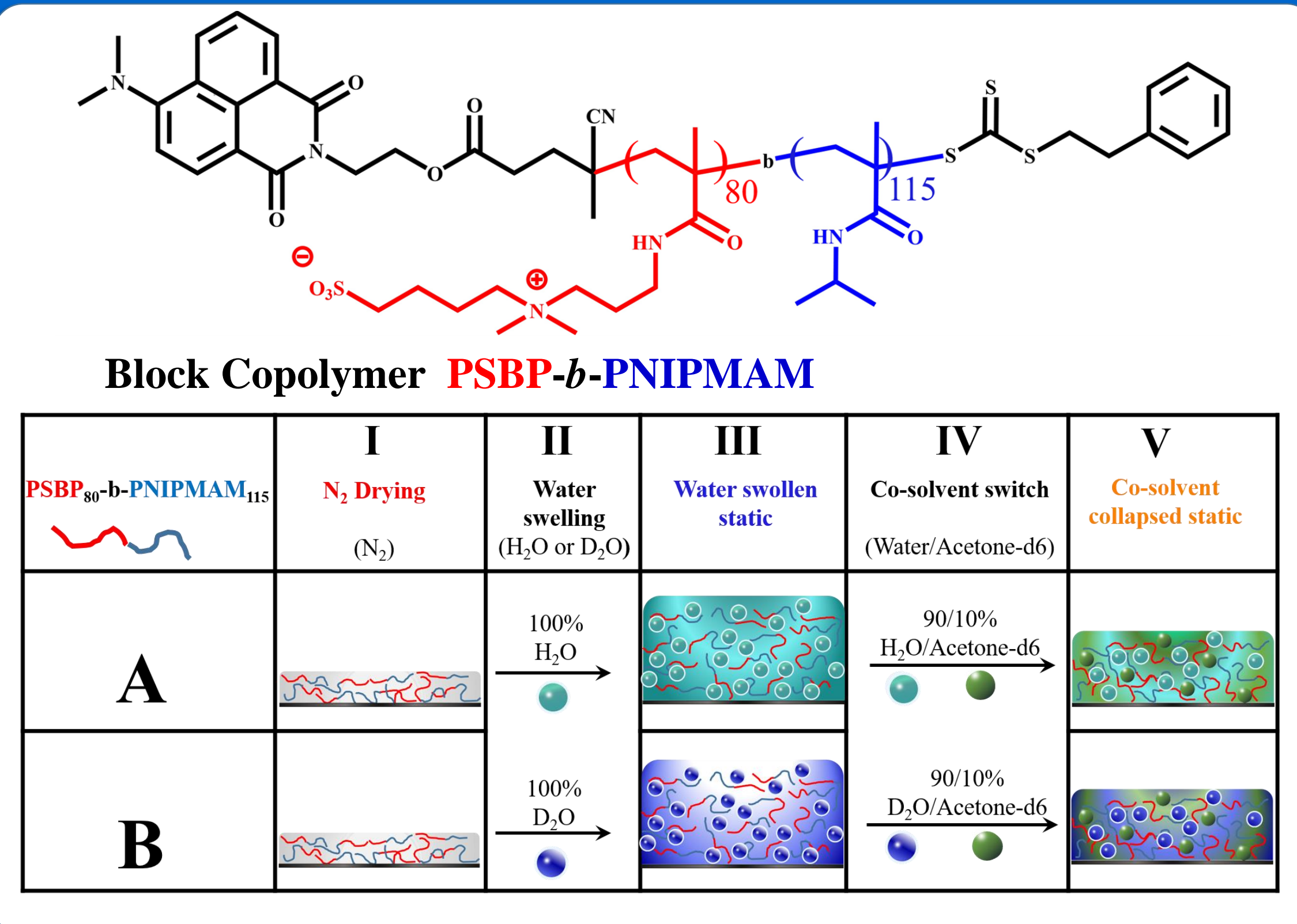
Natalya S. Vishnevskaya *et al.*, Aggregation behavior of doubly thermoresponsive polysulfobetaine-*b*-poly(N-isopropylacrylamide) diblock copolymers. *Macromolecules* **2016**, 49, (17), 6655-6668.

Applications serving as a pick-up move and release system

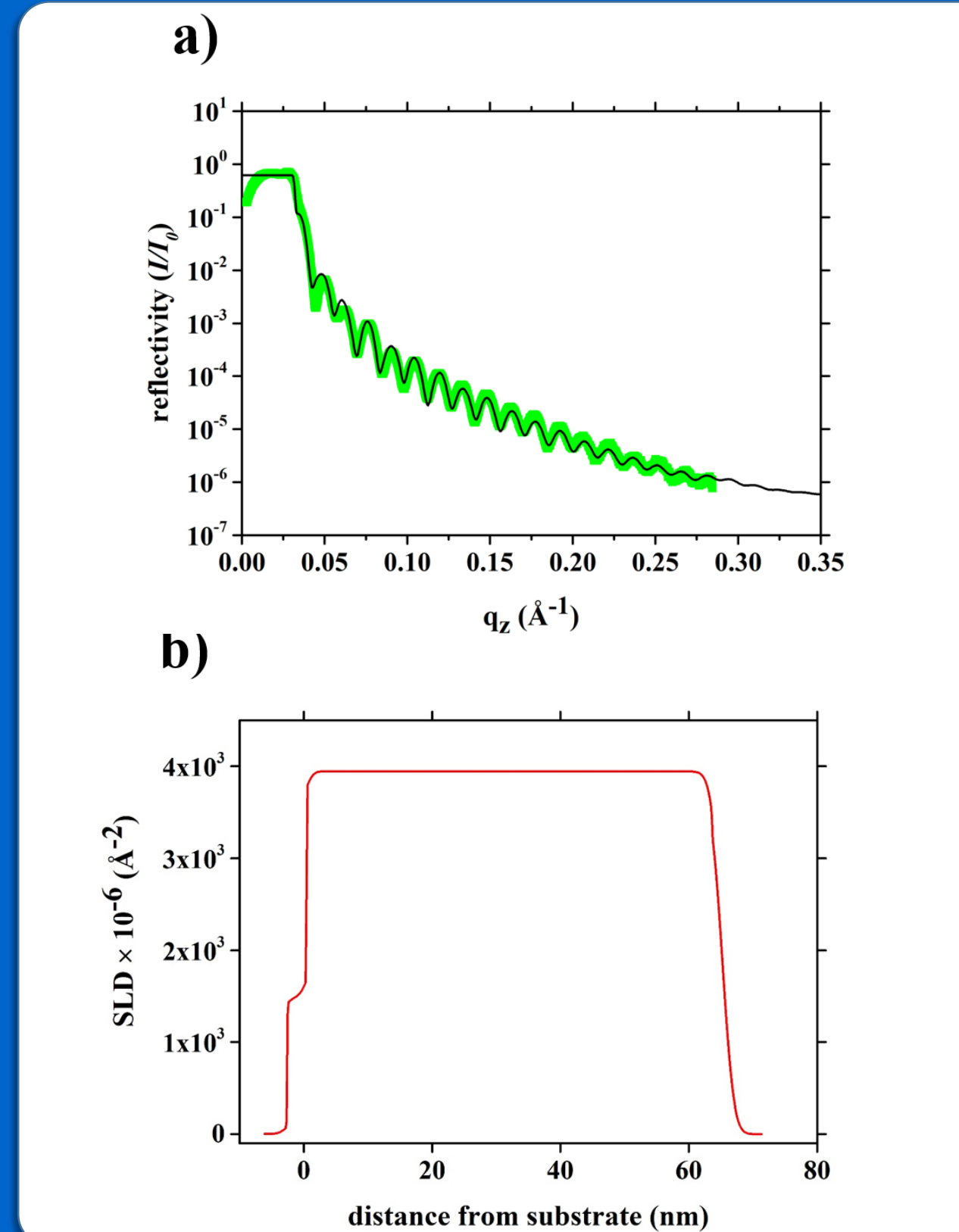


Yunlong Yu *et al.*, Pick up, move and release of nanoparticles utilizing co-nonsolvency of PNIPAM brushes. *Nanoscale* **2017**, 9, (4), 1670-1675.

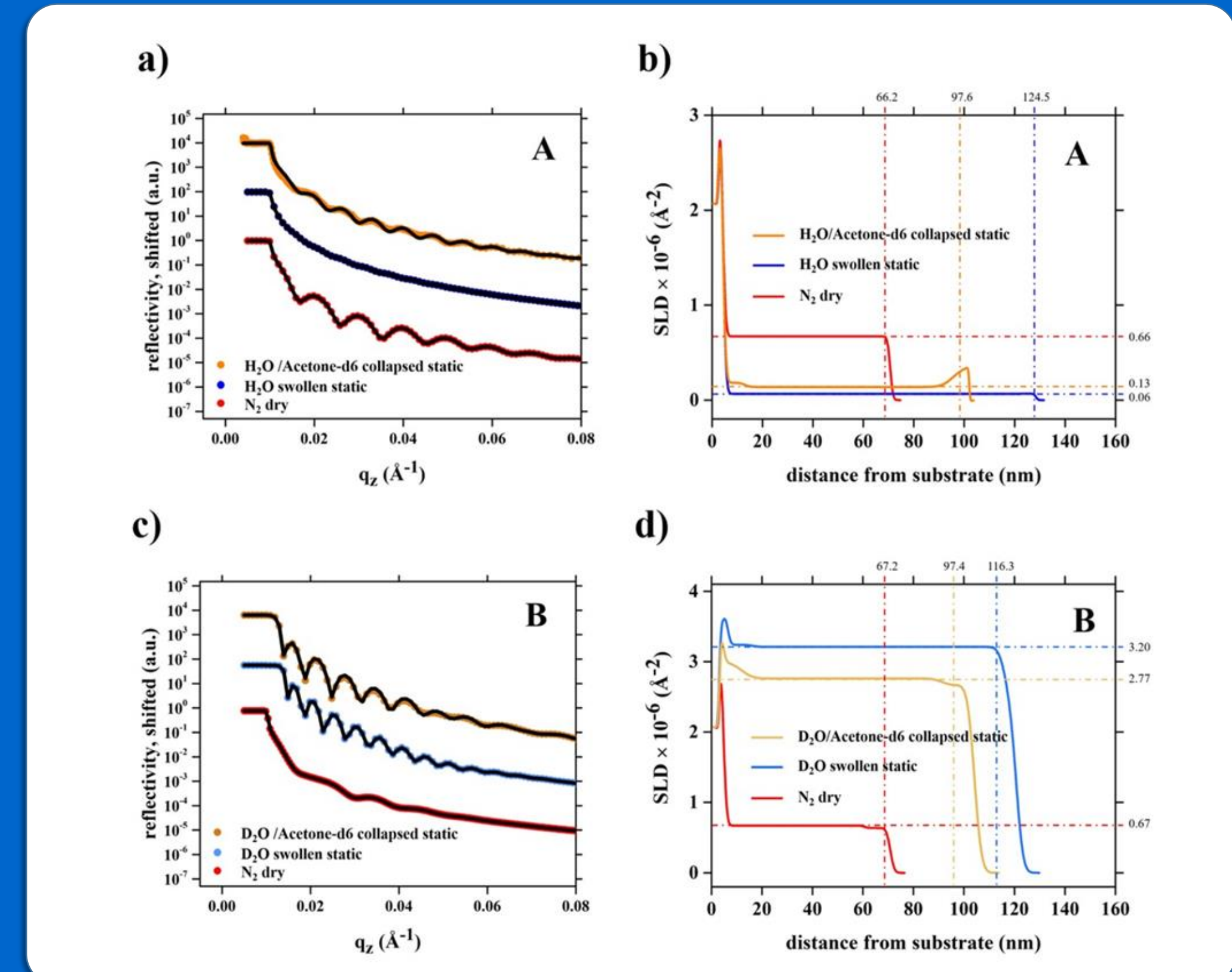
Experimental design



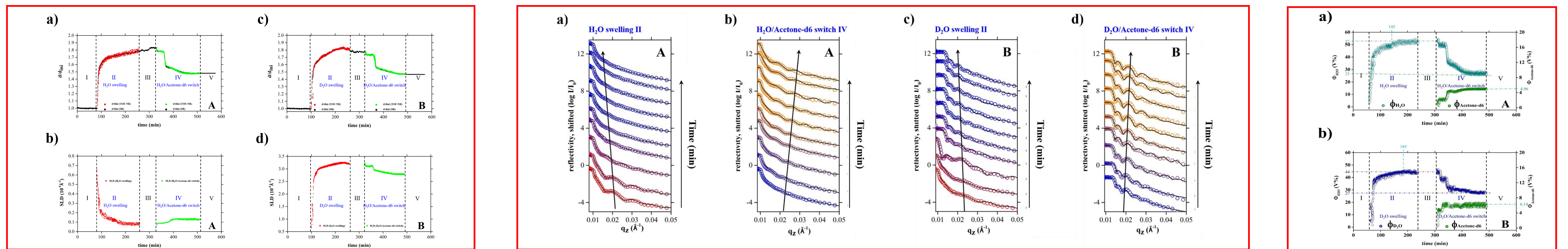
XRR measurement



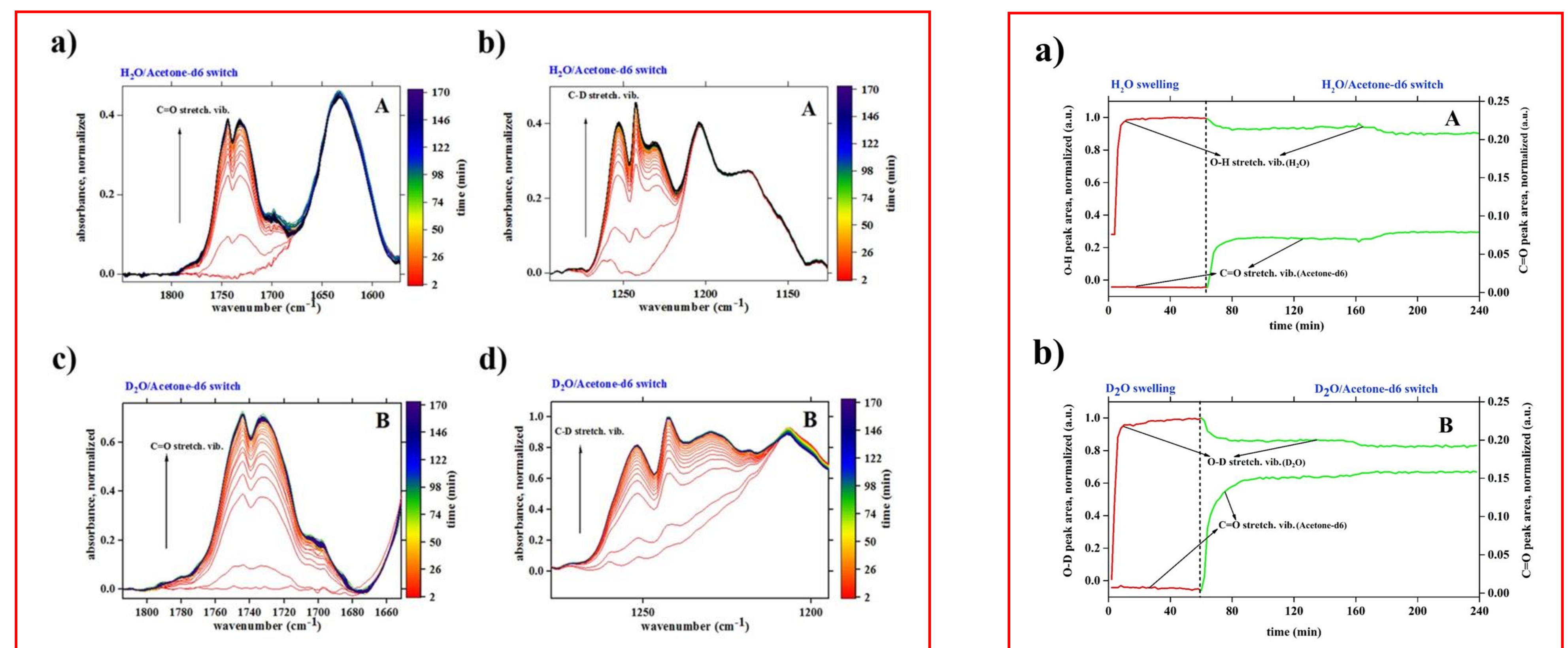
Static ToF-NR measurement



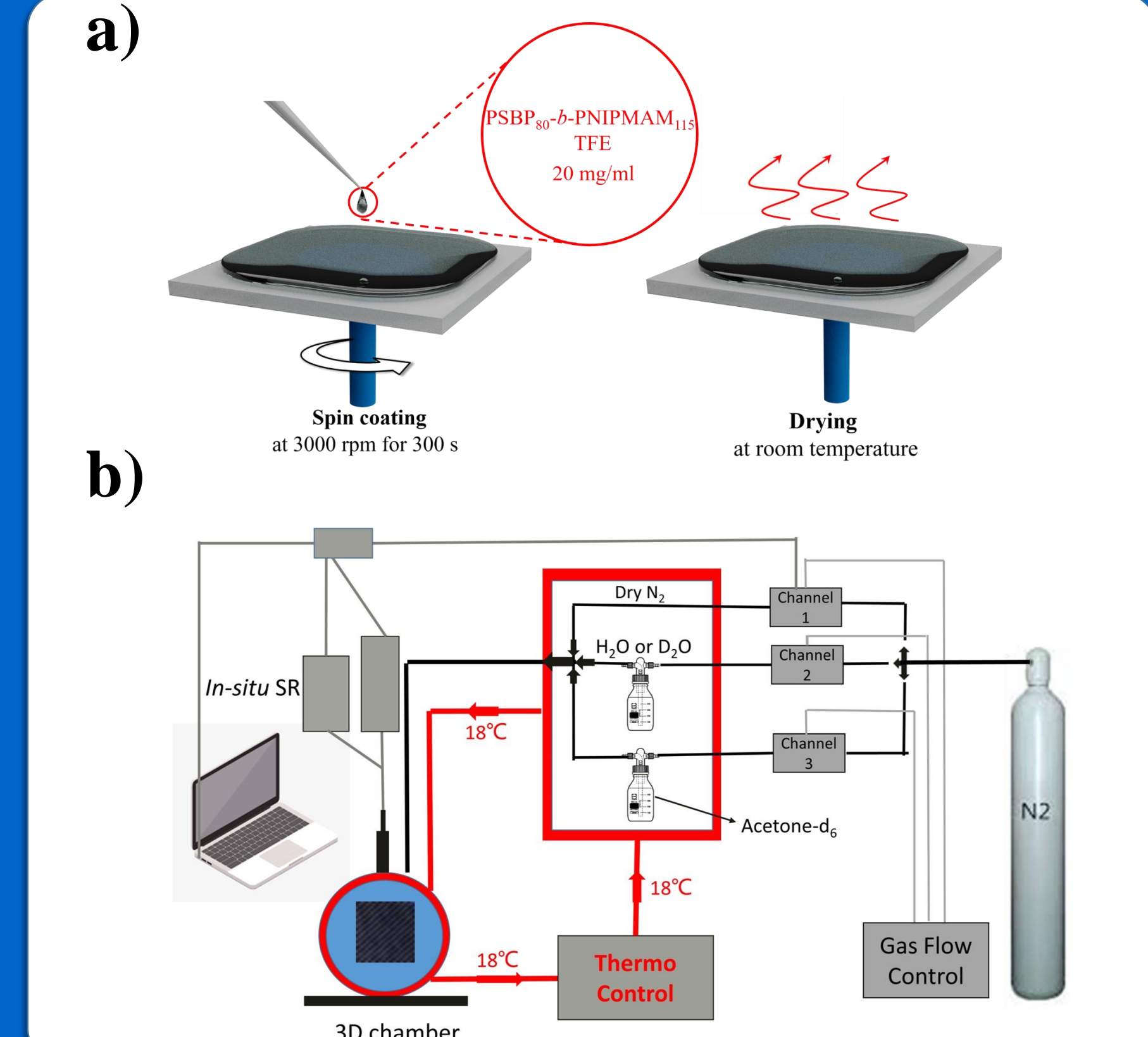
In situ ToF-NR measurement



FT-IR spectroscopy



Sample environment



Summary and outlook

1. The swelling behavior of PSBP₈₀-*b*-PNIPAM₁₁₅ thin films in saturated H₂O or D₂O vapors and a subsequent co-nonsolvency behavior in different mixed water/acetone-d₆ vapors with a ratio of 90%/10% were investigated.
2. The studied DBC achieves three vastly different and stable static thicknesses upon the swelling and co-nonsolvency effect, and the two blocks show a separate co-nonsolvency behavior in the water/acetone-d₆ atmosphere.
3. The studied DBC thin films become a good candidate in a wider range of promising applications, such as humidity sensors, multifunction switches, controlled release systems, and biopharmaceutical systems involving small amounts of acetone solvent.

