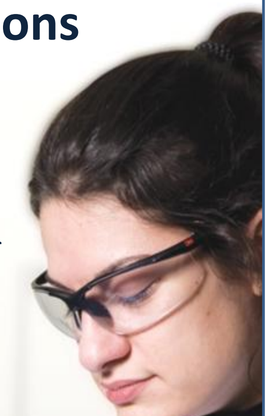
Introducing the Crystal16® for polymer applications

Would you like to increase your throughput characterizing polymer libraries?

*The **Crystal16®** is a desktop system for medium-throughput characterization of solubility, dispersion stability, and critical solution temperatures. The system is capable of running 16 experiments in parallel at a 1-ml scale. Four independent temperature zones combine magnetic stirring and turbidity measurements within each reactor to monitor changes in state as a result of time and temperature: giving you instant information on the solubility properties of polymers.*

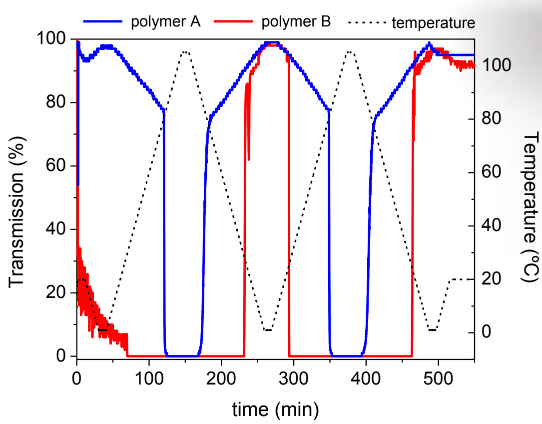


Solubility Determination

- Determine solubility in different solvents and binary solvent mixtures
- Completely soluble (co)polymers show transmission between 100-85%, during temperature cycling, indicating that the solutions remain clear, irrespective of temperature
- Polymers which are completely insoluble over the whole temperature range, will result in scattered transmission curves, due to the small particles floating in the vial

LCST and UCST behavior

- The LCST (Lower Critical Solution Temperature) is the point where precipitation upon heating occurs based on the hydrophilicity-hydrophobicity balance of a (co)polymer
- The LCST can be determined for both heating and cooling at 50% transmission.
- The UCST (Upper Critical Solution Temperature): the polymer is insoluble at low temperatures and becomes more soluble at higher temperatures, in temperature cycling experiments the transmission drops during the cooling step. From this solubility plot the precipitation temperature (T_p) can be determined at 50% transmission.



No transition was observed in the first heating cycle of Polymer B since the polymer was not yet dissolved due to relatively low water solubility.
Figures courtesy of R. Hoogenboom, TU/e, Eindhoven, The Netherlands

Dispersion formation

- A polymer which does not dissolve in the investigated temperature range, but which changes into a homogeneous dispersion, will initially show a scattered transmission curve, dropping to 0% transmission.
- Dispersion stability can also be followed, looking at the transmission as a function of temperature or time.

Self-assembly into micellar structures

Transmission profiles showing undissolved scattering particles are first dispersed upon heating (low transmission). Upon further heating the transmission increases, to 70%, where it stabilizes. The solutions often have a blue hue which is indicative of formation of micelles.

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