Concurrent control over sequence and dispersity in multiblock copolymers

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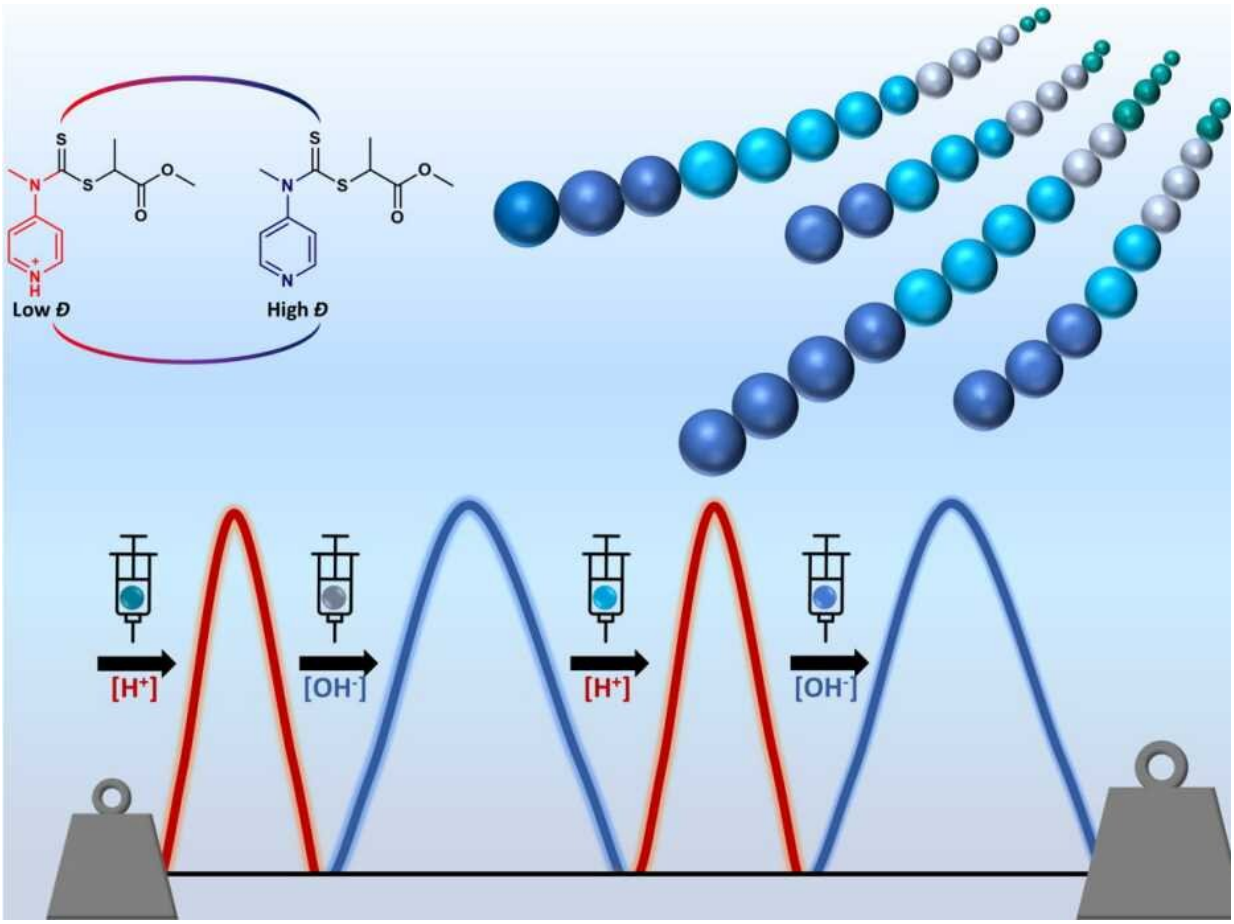

Credit: ETH Zurich

The group at Polymeric Materials has developed a simple way to

regulate both dispersity and sequence in highly complex multiblock copolymers, and the results have been published in *Nature Chemistry.*

Controlling monomer sequence and dispersity in synthetic macromolecules is a major goal in polymer science as both parameters determine materials' properties and functions. However, synthetic approaches that can simultaneously control both sequence and dispersity remain experimentally unattainable.

In this contribution from the group at Polymeric Materials we present a simple, one pot and rapid synthesis of sequence-controlled multiblocks with on-demand control over dispersity while maintaining a high livingness, and good agreement between theoretical and experimental molecular weights and quantitative yields. Key to our approach is the regulation in the activity of the chain transfer agent during a controlled radical polymerization that enables the preparation of multiblocks with gradually ascending (Đ= 1.16 → 1.60), descending (Đ= 1.66 → 1.22), alternating low and high dispersity values (Đ= 1.17 → 1.61 → 1.24 → 1.70 → 1.26) or any combination thereof. We further demonstrate the potential of our methodology through the synthesis of highly ordered pentablock, octablock and decablock copolymers, which yield multiblocks with concurrent control over both sequence and dispersity.

Mass spectrometry and theoretical calculations have been conducted by our collaborators at Monash University and CNRS respectively and we are very grateful for their support.

More information: Maria-Nefeli Antonopoulou et al, Concurrent control over sequence and dispersity in multiblock copolymers, *Nature Chemistry* (2021). DOI: 10.1038/s41557-021-00818-8

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