

# CONTROLLING POLYMER DISPERSITY VIA PHOTO-POLYMERIZATIONS

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Dispersity can significantly affect polymer properties and is a key parameter in materials design with both low and high dispersity polymers displaying complementary properties and functions. Tailoring polymer dispersity not only enables the synthesis of a wide range of polymeric materials but also enhances our fundamental understanding on complex polymerization mechanisms. New synthetic strategies to control polymer dispersity in both photo-atom transfer radical polymerization (photo-ATRP) [1] and photoinduced electron/energy transfer reversible addition-fragmentation chain-transfer (PET-RAFT) polymerization [2] will be presented and critically discussed. By either varying the catalyst concentration (in ATRP) or by mixing RAFT agents of different reactivity, good control over the dispersity of a range of polymer classes can be efficiently achieved in both homopolymers and block copolymers. Importantly, high end group fidelity can be ensured in all cases, regardless the initial dispersity. We believe that our work significantly expands the scope and availability of tailored-made polymeric materials and can be used in various applications including phase-separation, rheology, macromolecular folding and drug delivery.

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[1] Whitfield, R., Parkatzidis, K., Rolland, M., Truong, N. P. & Anastasaki, A. Tuning dispersity by photoinduced atom transfer radical polymerisation: monomodal distributions with ppm copper concentration. *Angew. Chem. Int. Ed.* 58, 13323-13328 (2019)

[2] Parkatzidis, K., Truong, N.P., Antonopoulou, M.-N., Whitfield, R., Konkolewicz, D. & Anastasaki, A. Tailoring polymer dispersity by mixing chain transfer agents in PET-RAFT polymerization. *Polym. Chem.* 11, 4968-4972 (2020)