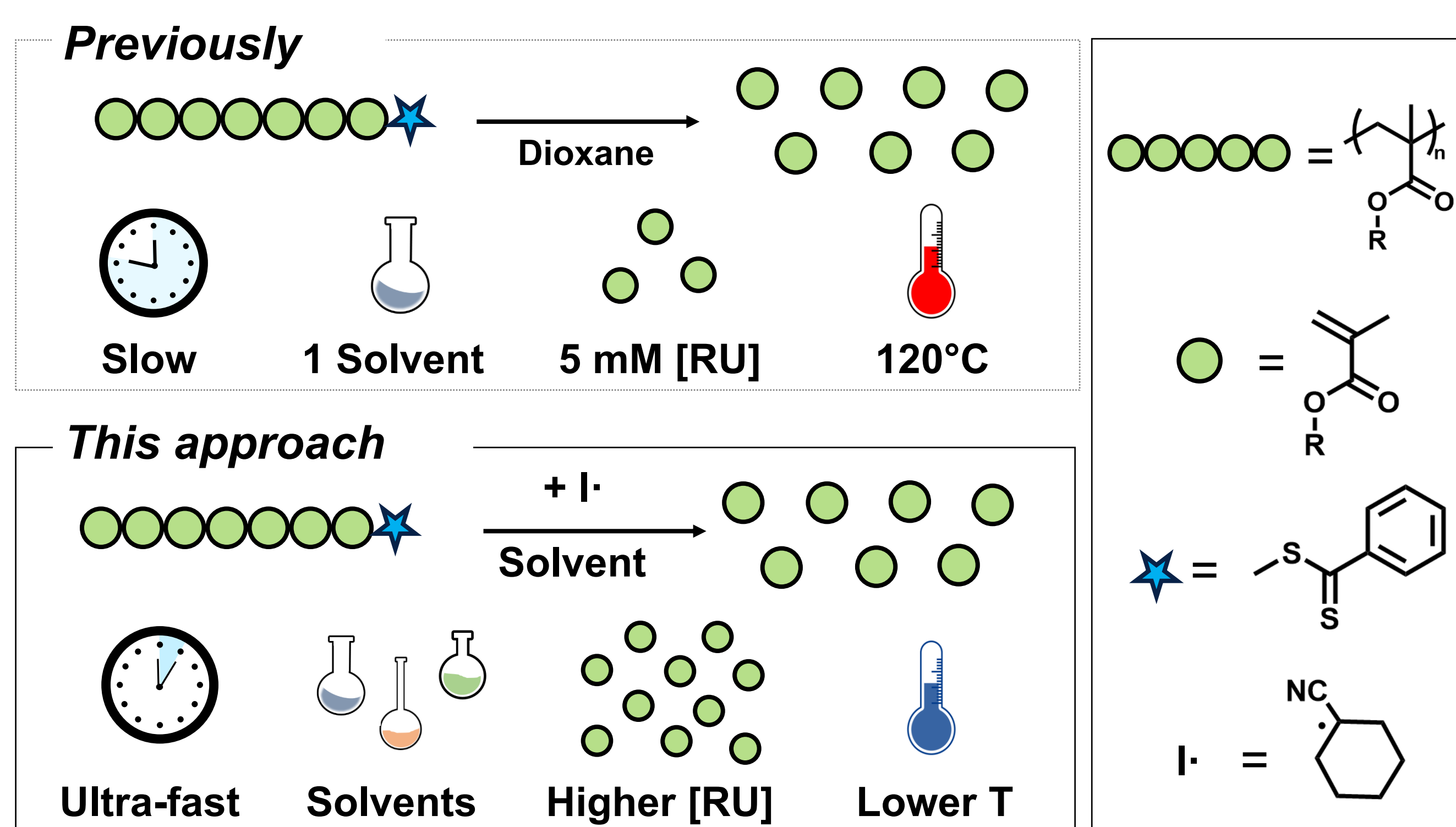


Ultra-fast Thermal RAFT Depolymerization at Higher Solid Contents

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1 Thermal RAFT Depolymerization

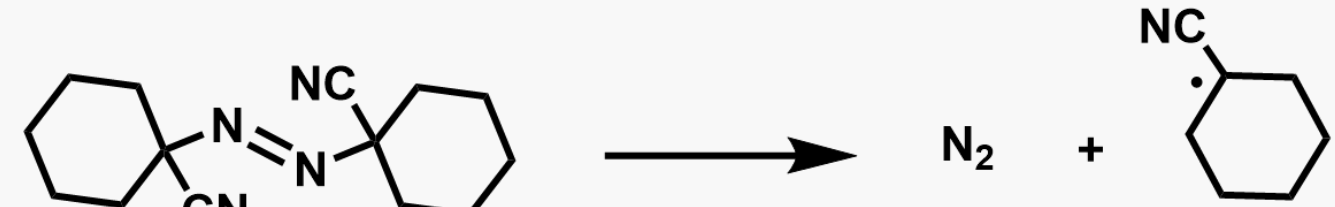
Thermal solution RAFT depolymerization is an efficient chemical recycling methodology. Current approaches require specialized solvents (i.e. dioxane) and typically suffer from extended reaction times, and operate exclusively under highly diluted conditions. To circumvent these limitations, a commercial radical initiator is introduced.



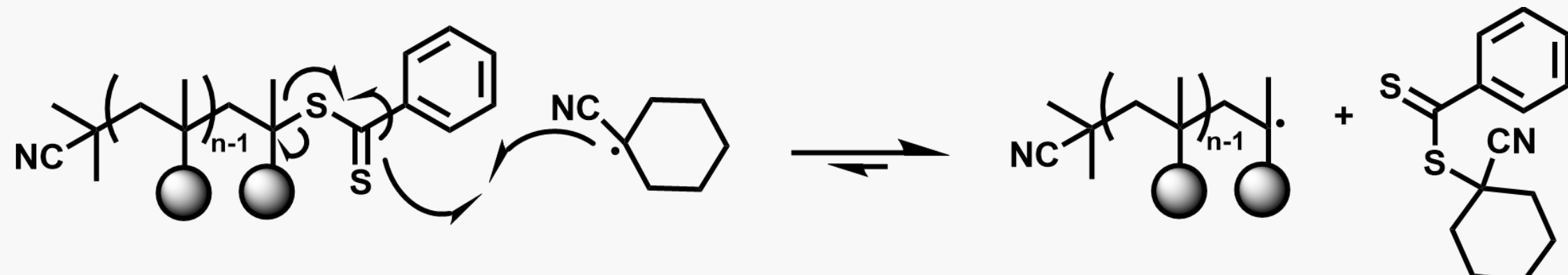
2 Hypothesis

- In the absence of radicals the polymer chains are **kinetically trapped**.
- ✓ The addition of radical initiator promotes **chain-end activation**.

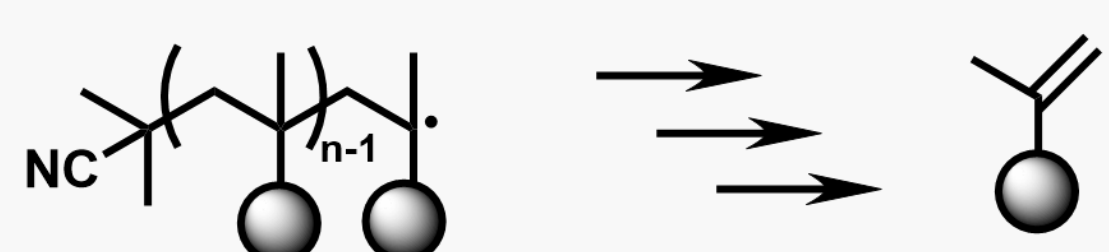
Initiator decomposition



Chain-end activation

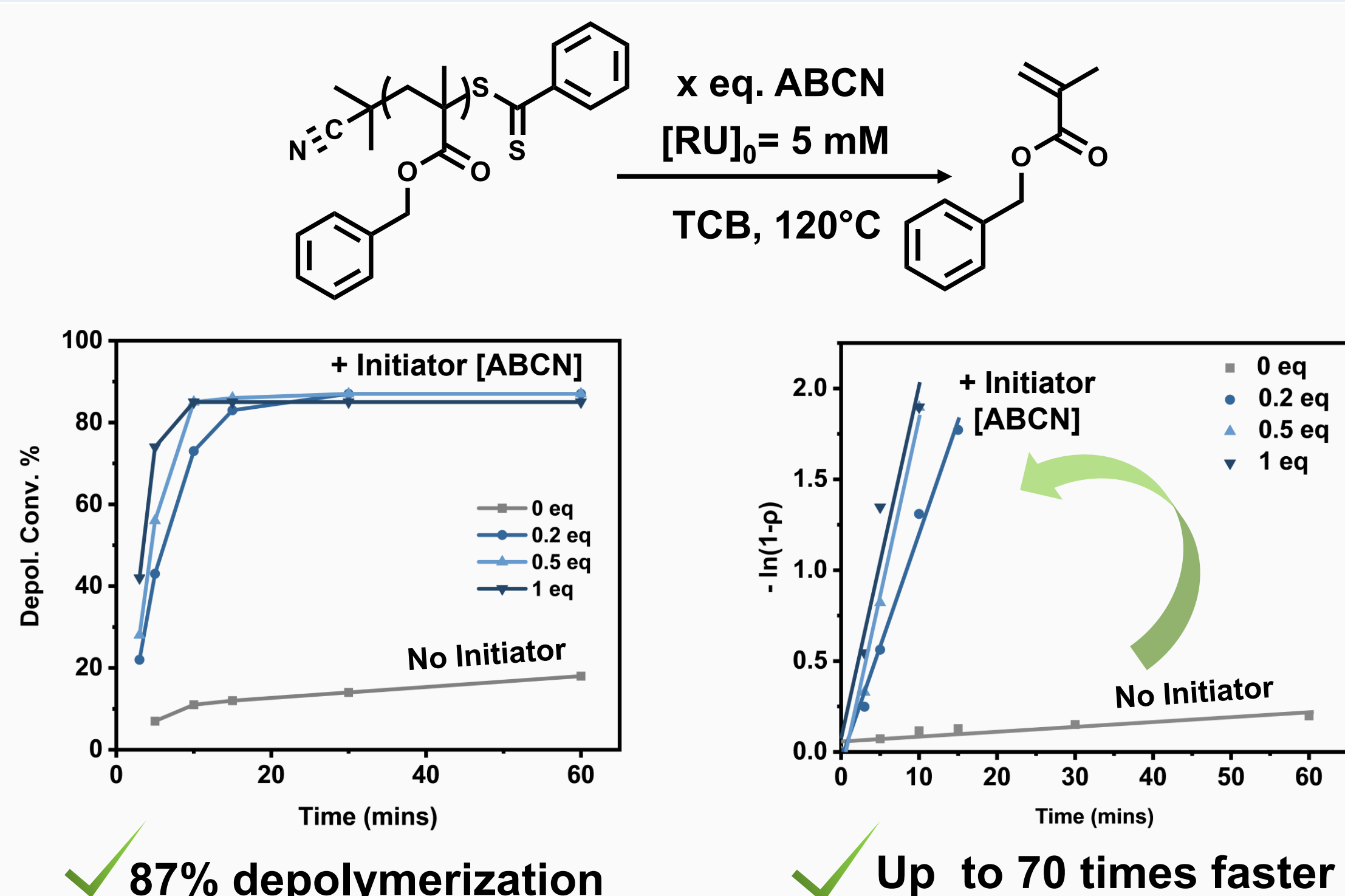


Depropagation



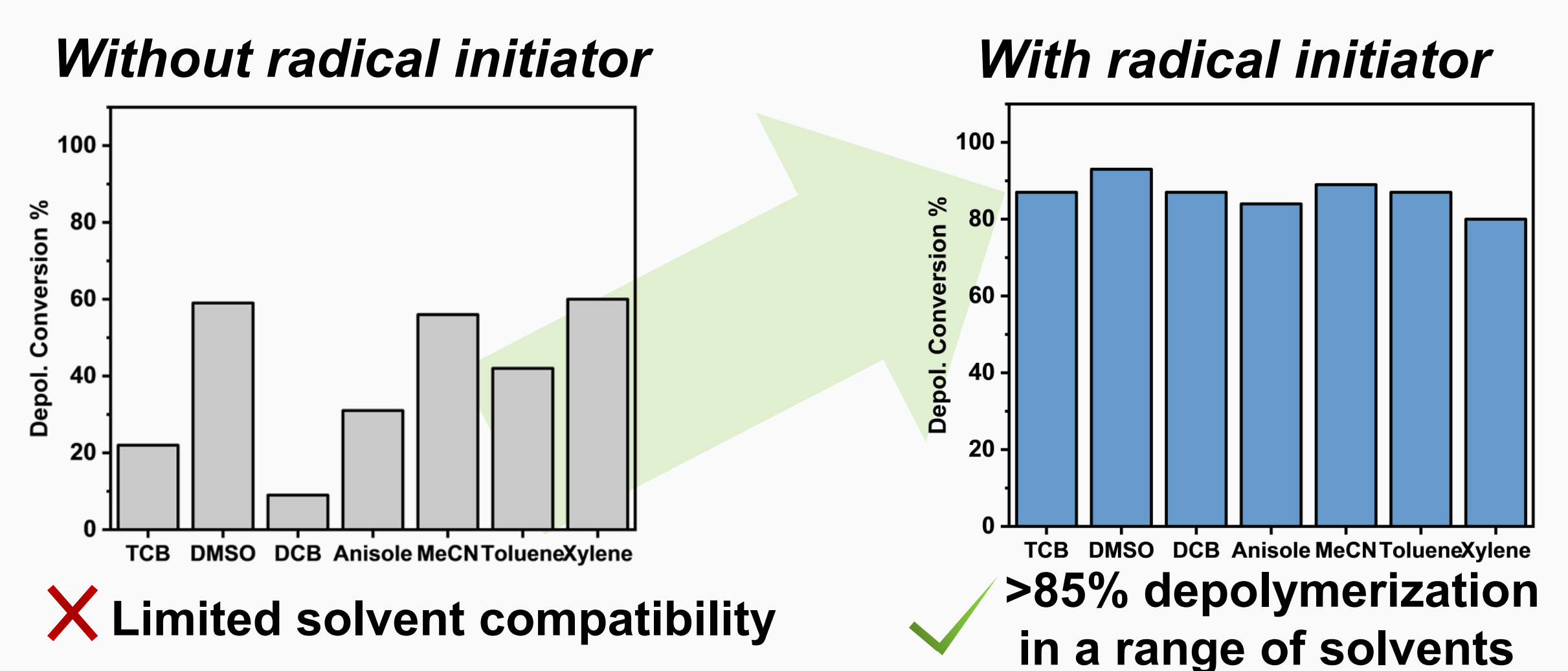
3 Rate Enhancement

- ✓ By optimizing the radical flow into the system, we can increase the depolymerization rate, without compromising conversion.



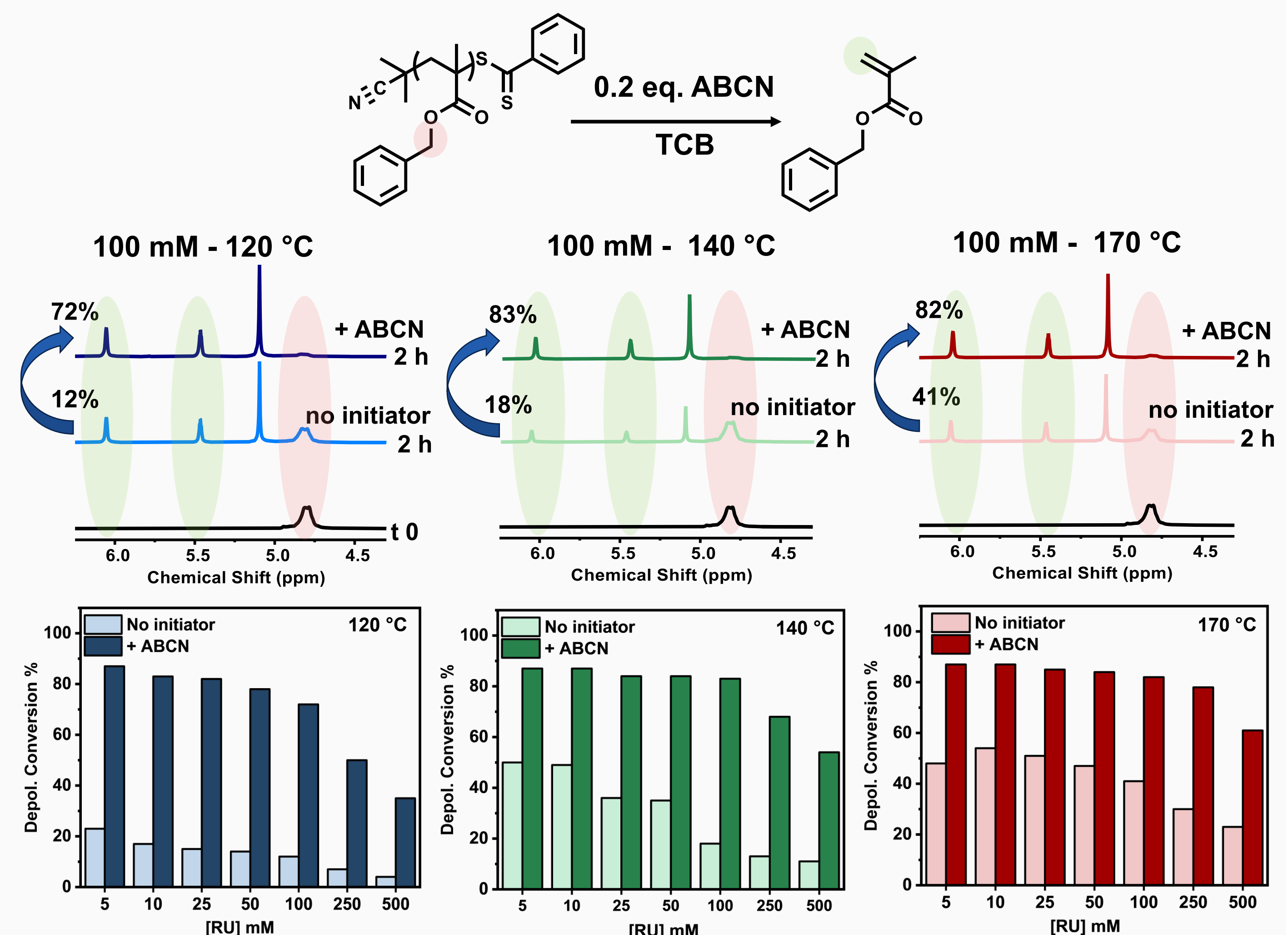
4 Solvent Compatibility

- ✓ The addition of radical initiator omits the use of a specialized solvent as a radical provider.



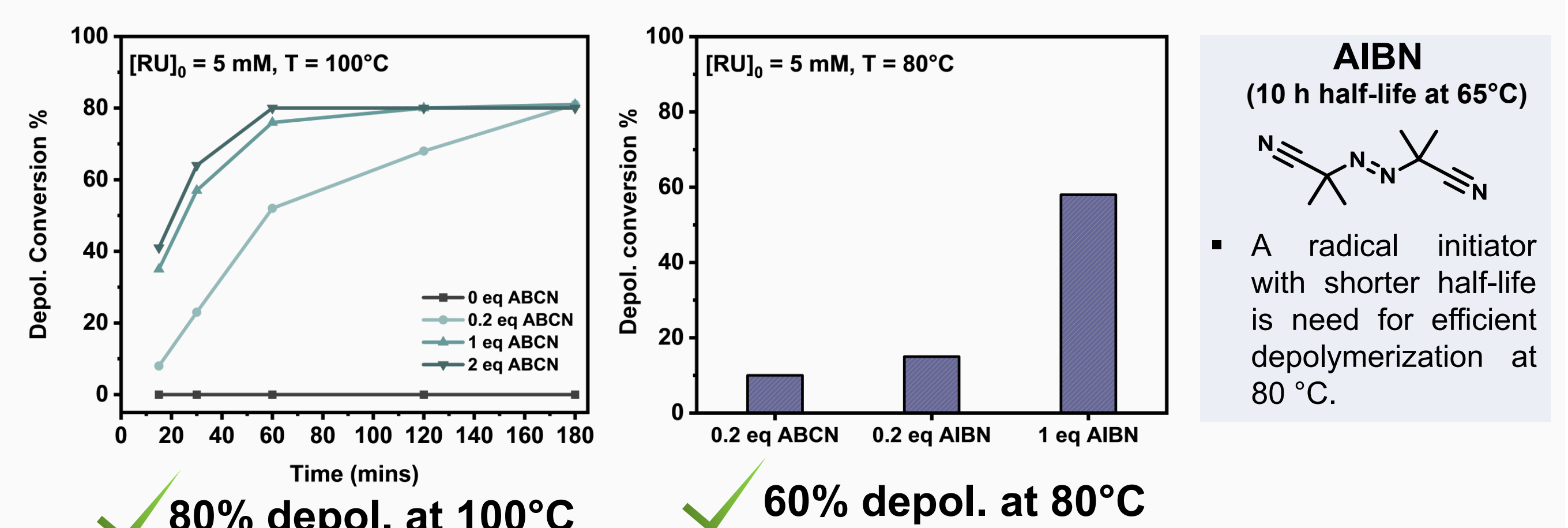
5 Increased Polymer Loadings

- ✓ In the absence of radical initiator, activation is not efficient even at high temperatures – The system is limited to low [RU]
- ✓ The addition of radical initiator provides sufficient activation at high [RU]



6 Lower Depolymerization Temperatures

- ✓ Chain-end activation is efficient even at lower temperatures allowing for significant monomer regeneration



References

1. D. Mantzara, R. Whitfield, H. S. Wang, N. P. Truong, A. Anastasaki, *ACS Macro Lett.* 2025, **14**, 235–240