Fluorinated Block Copolyesters via Switchable Ring-Opening Alternating Copolymerization: Reactivity and Self-Healing Insights

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epf GRONINGEN 2025

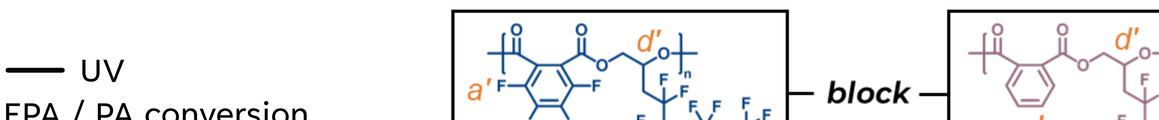
INTRODUCTION

— Why Sequence Matters —

ABS	*SMA®*	*SEBS*
Acrylonitrile-Butadiene-Styrene (Stiffness and Toughness)	*Styrene-Maleic Anhydride* (Transparent)	*Styrene-Ethylene-Butylene-Styrene* (Elastic and Soft)



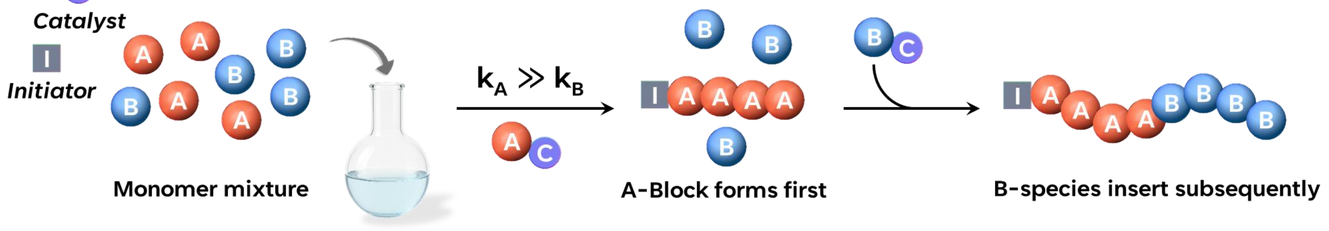
Random copolymer	Alternating copolymer	Block copolymer

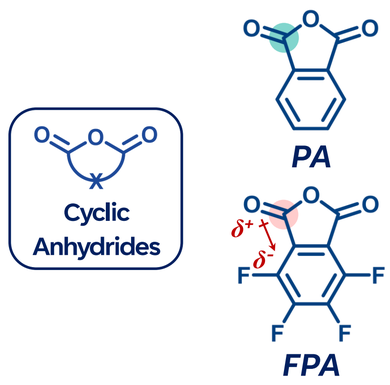


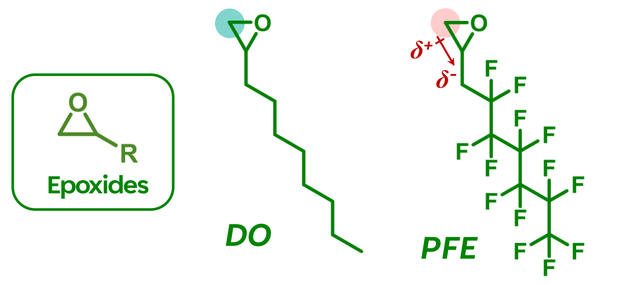
"Sequence determines structure. Structure defines function."

— In this research —

Intrinsic-Reactivity-Driven Sequence Control via ROAC

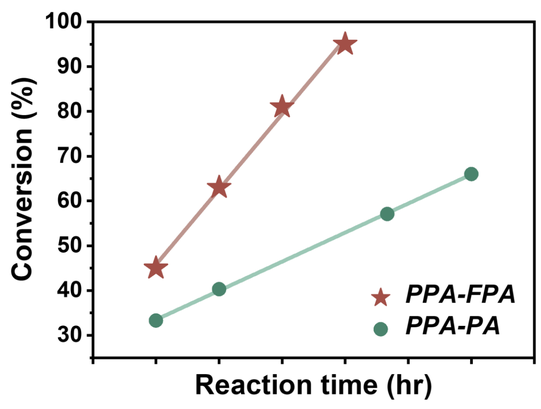


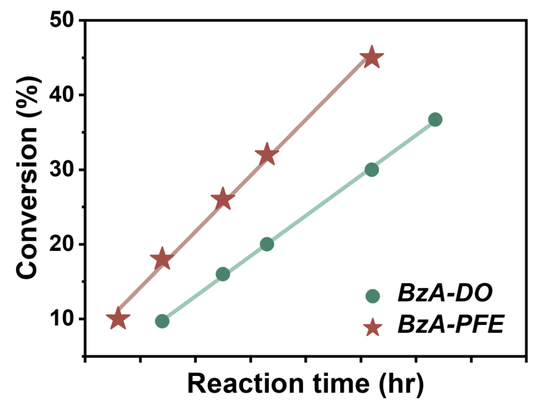




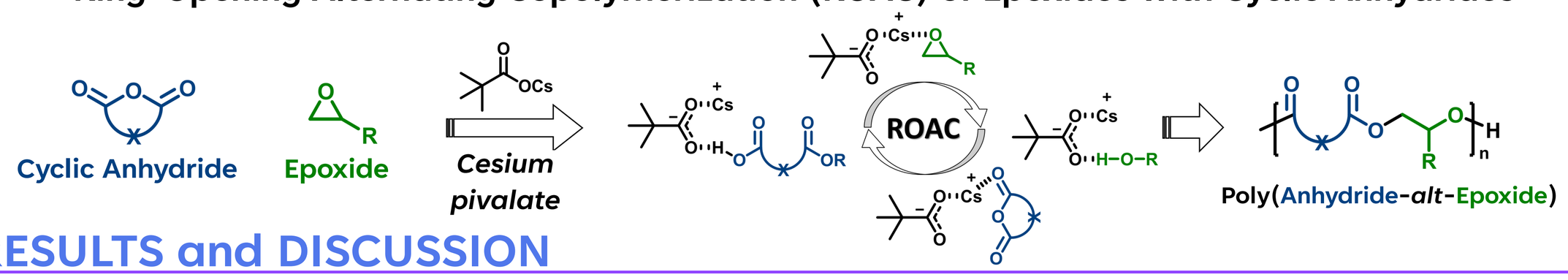
Electron density: with F > without F

Electrophilicity: with F < without F



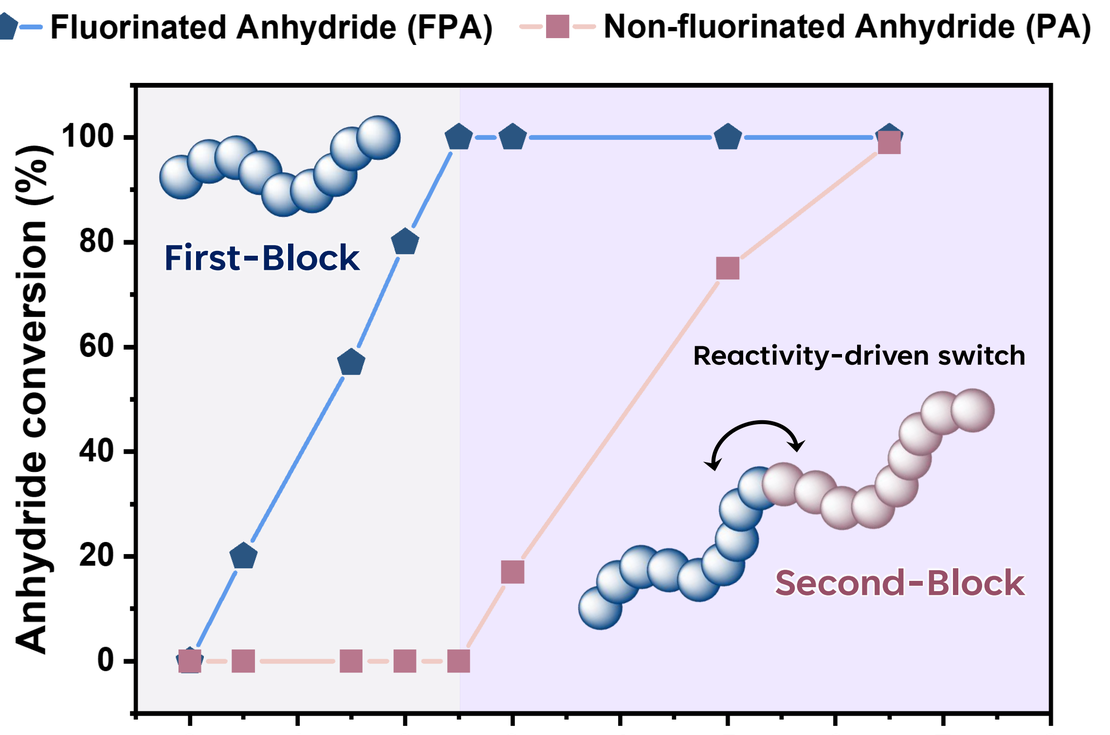


Ring-Opening Alternating Copolymerization (ROAC) of Epoxides with Cyclic Anhydrides



RESULTS and DISCUSSION

— Sequence-Controlled Block Formation —



Segment-A entirely consumes → Then Segment-B starts.

— Self-Healable Block Copolymer —

Under OM observation

KEY TAKEAWAYS

Design & Mechanism

- Fluorine induces reactivity contrast in ROAC by modulating both monomers and chain ends.
- Segment control is achieved in one pot via intrinsic kinetic selectivity.

Function & Application

- Self-healing films recover at room temperature with no solvent or external force.
- Additive blending promotes cohesive healing and soft-material potential.

Manuscript in preparation...

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