

Cover Image

Challenges and Recent Developments of Photoflow-Reversible Deactivation Radical Polymerization (RDRP)

Zhuo-Ran Zhong, Yi-Nan Chen, Yang Zhou, and Mao Chen

Photoflow-controlled reversible-deactivation radical polymerization (photoflow-RDRP) has provided opportunities to improve the synthetic efficiency of photo-RDRP and has facilitated the combination with different cutting-edge techniques. This work summarizes the challenges and recent achievements in photoflow-RDRP, which we hope could provide informative knowledge to people in related fields and stimulate new ideas.



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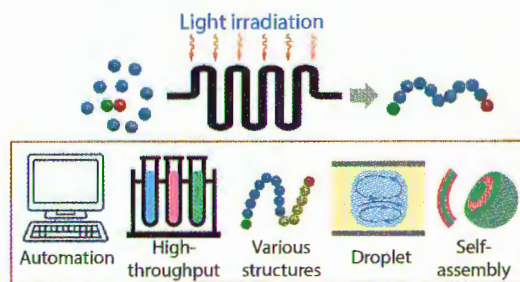
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Feature Articles

Challenges and Recent Developments of Photoflow-Reversible Deactivation Radical Polymerization (RDRP)

Zhuo-Ran Zhong, Yi-Nan Chen, Yang Zhou, and Mao Chen

While photoflow-RDRP has been developed as a modern technique to streamline precise polymerization with decreased space/labor cost and improved production efficiency without compromising structural control, recent years have witnessed the advancements of solutions for viscosity, combination with computer power and utilization in polymerization induced self-assembly.



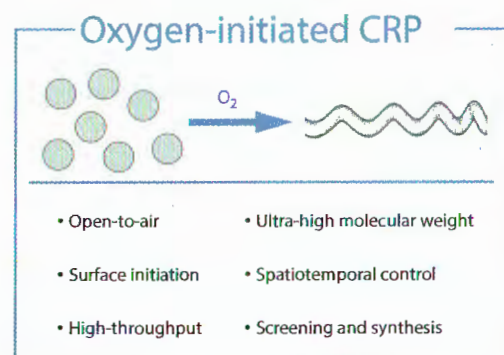
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Controlled Radical Polymerization: from Oxygen Inhibition and Tolerance to Oxygen Initiation

Ning Li and Xiang-Cheng Pan

Oxygen-initiated controlled radical polymerization (CRP) has been successfully conducted using alkylborane as co-initiators under the ambient conditions, providing the opportunity for spatiotemporal control, surface initiation and high-throughput synthesis. Rationally synthesized alkylborane derives the predesigned the initiating radical to minimize the side reactions, achieving the synthesis of ultra-high molecular weight polymers.



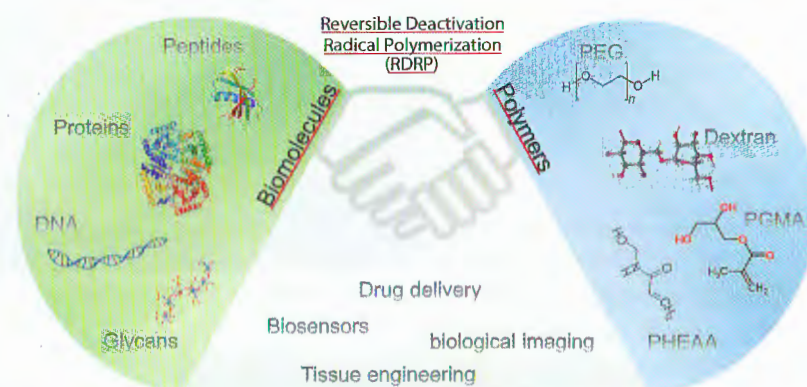
Chinese Journal of Polymer Science, 2021, 39(9), 1084–1092
<https://doi.org/10.1007/s10118-021-2597-9>

Reviews

Rational Design of Biomolecules/Polymer Hybrids by Reversible Deactivation Radical Polymerization (RDRP) for Biomedical Applications

Jie Zhou, Xiao-Yuan Zhang, and Zhi-Qiang Su

Biomolecules and polymers were linked by RDRP reaction, and the preparation and biomedical applications of biomolecule polymer hybrids were introduced. RDRP and other polymerization methods were explained and compared respectively. The possibility and superiority of RDRP to modify the original materials to prepare functional and intelligent materials were highlighted.

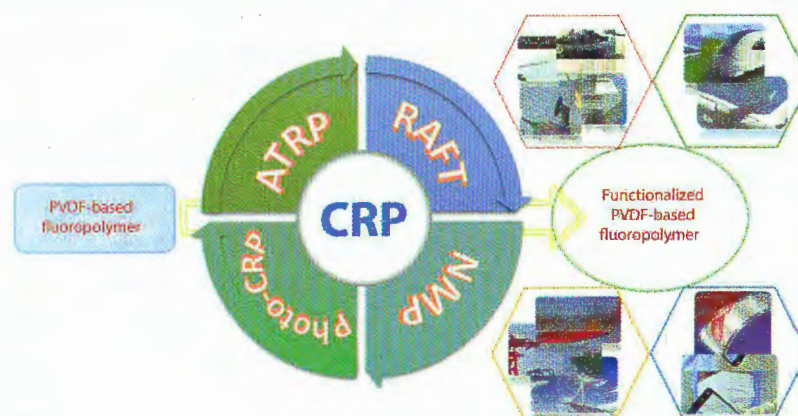


Chinese Journal of Polymer Science, 2021, 39(9), 1093–1109
<https://doi.org/10.1007/s10118-021-2543-x>

The Application of Controlled/Living Radical Polymerization in Modification of PVDF-based Fluoropolymer

Hong-Hong Gong, Ying Zhang, Yi-Pin Cheng, Ming-Xin Lei, and Zhi-Cheng Zhang

Poly(vinylidene fluoride) (PVDF) based fluoropolymers is one of the most common types of commercial fluoropolymers especially used as dielectric materials. After modification used CRP, such as ATRP, RAFT, NMP, and photo-CRP, they could be widely used in microelectronics, optics, aerospace, transducers.



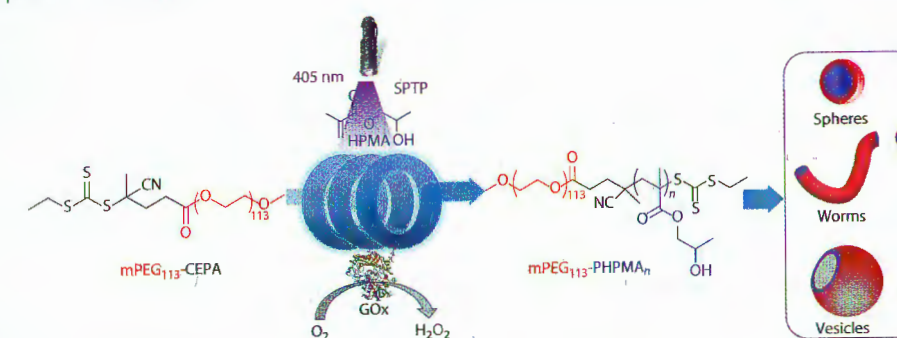
Chinese Journal of Polymer Science, 2021, 39(9), 1110–1126
<https://doi.org/10.1007/s10118-021-2616-x>

Articles

Enzyme-assisted Photoinitiated Polymerization-induced Self-assembly in Continuous Flow Reactors with Oxygen Tolerance

Wei-Bin Cai, Dong-Dong Liu, Ying Chen, Li Zhang, and Jian-Bo Tan

An enzyme-assisted photoinitiated polymerization-induced self-assembly (photo-PISA) in continuous flow reactors is developed. The addition of glucose oxidase (GOx) and glucose into the reaction mixture can consume oxygen efficiently and constantly, allowing the flow photo-PISA to be performed under open-air conditions.

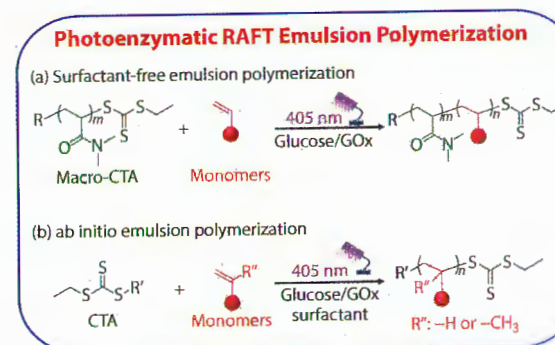


Chinese Journal of Polymer Science, 2021, 39(9), 1127–1137
<https://doi.org/10.1007/s10118-021-2533-z>

Photoenzymatic RAFT Emulsion Polymerization with Oxygen Tolerance

Ruo-Yu Li and Ze-Sheng An

Photoenzymatic RAFT emulsion polymerization, surfactant-free or ab initio, of various monomers can be achieved with oxygen tolerance. More importantly, ultrahigh molecular weight amphiphilic block copolymers could be prepared by this method.

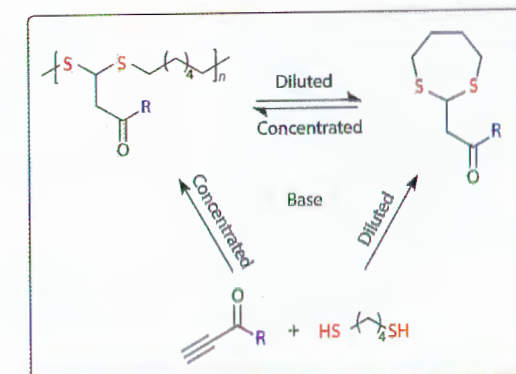


Chinese Journal of Polymer Science, 2021, 39(9), 1138–1145
<https://doi.org/10.1007/s10118-021-2556-5>

Dynamic Ring-chain Equilibrium of Nucleophilic Thiol-yne “Click” Polyaddition for Recyclable Poly(dithioacetal)s

Jin-Xia Lei, Qi-Yuan Wang, Fu-Sheng Du, and Zi-Chen Li

We report a dynamic polymerization system based on the reversible nucleophilic Michael polyaddition of activated alkynes and dithiols. This dynamic behavior was attributed to the concentration-dependent dynamic ring-chain equilibrium between polymers and seven-membered dithioacetals in basic solutions. On the basis of these findings, the first example of closed-loop recyclable poly(dithioacetal) was developed.

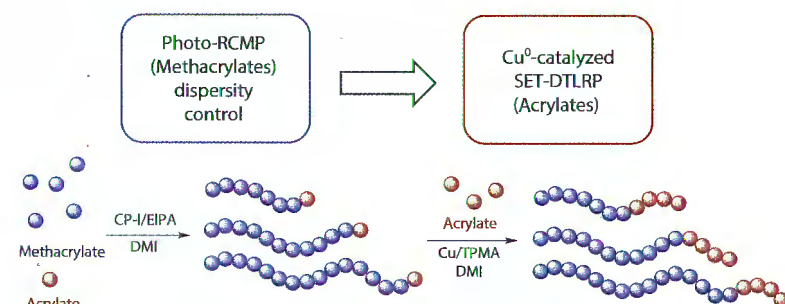


Chinese Journal of Polymer Science, 2021, 39(9), 1146–1154
<https://doi.org/10.1007/s10118-021-2587-y>

Molar Mass Dispersity Control by Iodine-mediated Reversible-deactivation Radical Polymerization

Jin-Ying Wang, Yuan-Yuan Ni, Jian-Nan Cheng, Li-Fen Zhang, and Zhen-Ping Cheng

A novel regulating polymer dispersity strategy while maintaining "living" features of polymer chains was successfully established by combination with blue LED light-controlled RCMP and SET-DTLRP.



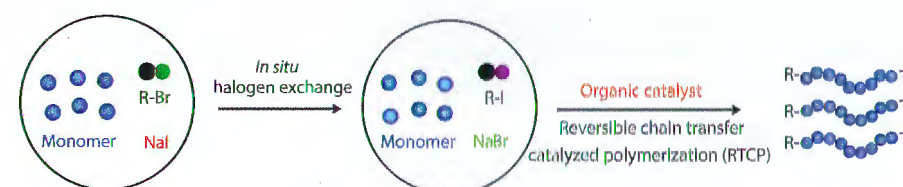
Chinese Journal of Polymer Science, 2021, 39(9), 1155–1160

<https://doi.org/10.1007/s10118-021-2602-3>

Reversible Chain Transfer Catalyzed Polymerization with Alkyl Iodides Generated from Alkyl Bromides by *in Situ* Halogen Exchange

Dan-Ni Gao, Yu-Lai Zhao, Jing-Yu Cai, Lin-Xi Hou, and Long-Qiang Xiao

In this study, alkyl iodide (R-I) which was generated from *in situ* bromine-iodine transformation of alkyl bromide (R-Br) with sodium iodide (NaI), was served as an environmentally friendly initiator to exhibit powerful polymerization properties toward RTCP with organocatalysts TMP or XT, providing a significant method for synthesizing functional polymers.



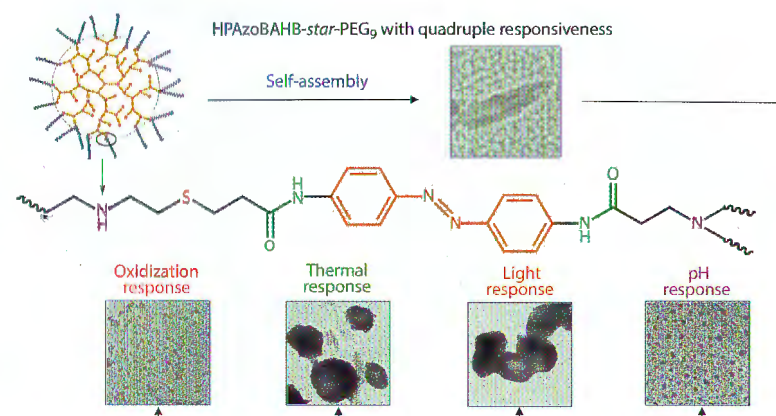
Chinese Journal of Polymer Science, 2021, 39(9), 1161–1168

<https://doi.org/10.1007/s10118-021-2611-2>

Hyperbranched Azopolymer with Quadruple Responsibility

Chen Tian, Ke-Cong Zhou, Yu-Fei Lu, Jin-Jie Li, Yuan Yao, Xin-Feng Tao, Qi-Xin Zhuang, Yu-Feng Xie, and Shao-Liang Lin

Simply constructing multiple responsive polymers upon different stimuli is still rarely reported. Herein, we combined four stimuli-sensitive moieties, including azobenzene chromophore, sulfide, amide and amine once in all into a hyperbranched architecture through Michael addition to obtain a light, temperature, pH and oxidation responsive hyperbranched polymer named HPAzoBAHB-star-PEG₉.



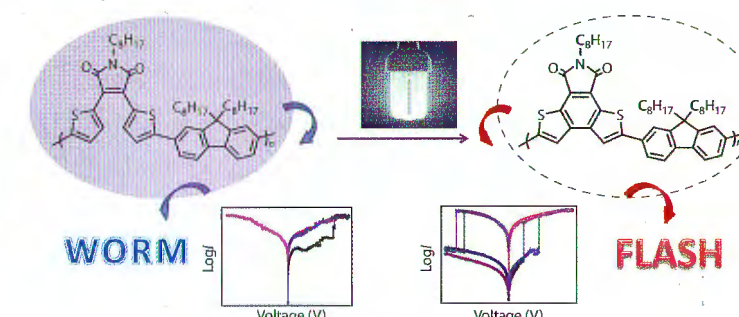
Chinese Journal of Polymer Science, 2021, 39(9), 1169–1176

<https://doi.org/10.1007/s10118-021-2576-1>

Dithienylmaleimide-based D-A Conjugated Polymer Film: Photo-responsive Behavior and Application in Electrical Memory and Logic Gates

Wei Lv, Chun Wang, Xing-Chi Lin, Xiao-Fei Mei, Wen Wang, E Yang, Qi-Dan Ling, and Zheng-Huan Lin

D-A type polymer PTMF-o containing photoactive units has been designed and synthesized. The structure and optoelectronic property of PTMF-o are changed by the irradiation of light. Consequently, the resistance switching performance of PTMF-o can be changed from WORM to FLASH by light stimuli. PTMF-o film can also be employed as smart material to construct NAND and NOR logic gates.



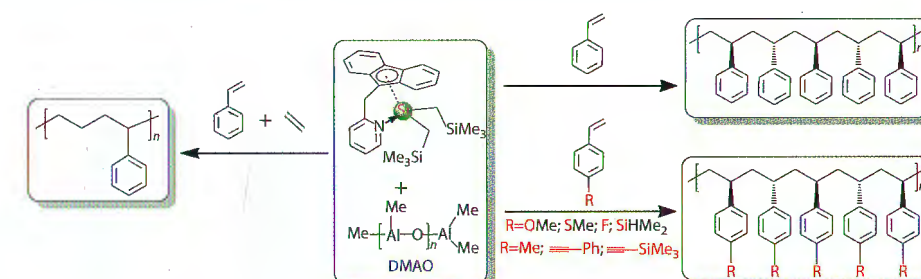
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DMAO-activated Rare-earth Metal Catalysts for Styrene and Its Derivative Polymerization

Zhen Zhang, Yang Jiang, Kai Zhang, Zhong-Yi Cai, Shi-Hui Li, and Dong-Mei Cui

Rare-earth metal bis(alkyl) complexes, for the first time, are activated by a non-boron based-cocatalyst, DMAO, and show extremely high activity for the syndiospecific polymerization of styrene and its derivatives. Furthermore, the binary system is capable of catalyzing the random copolymerization of ethylene and styrene to afford *pseudo*-random ethylene-styrene copolymers.



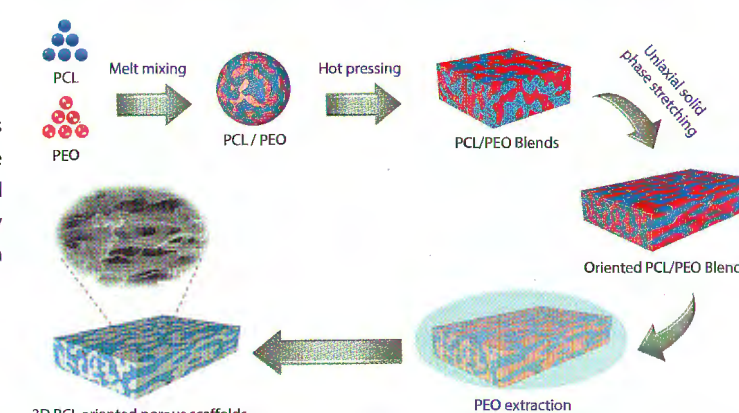
Chinese Journal of Polymer Science, 2021, 39(9), 1185–1190

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Fabrication of Highly Anisotropic and Interconnected Porous Scaffolds to Promote Preosteoblast Proliferation for Bone Tissue Engineering

Ya-Hui Liu, Wei Liu, Zi-Li Zheng, Xin Wei, Nouman Ali Shah, Hao Lin, Bai-Song Zhao, Shi-Shu Huang, Jia-Zhuang Xu, and Zhong-Ming Li

Bionic scaffolds with directional and interconnected pores through uniaxial stretching and selective extraction were fabricated, which promoted the proliferation and osteoblastic differentiation of preosteoblasts. This strategy enriched the toolbox for the scaffold design and fabrication for bone tissue engineering.



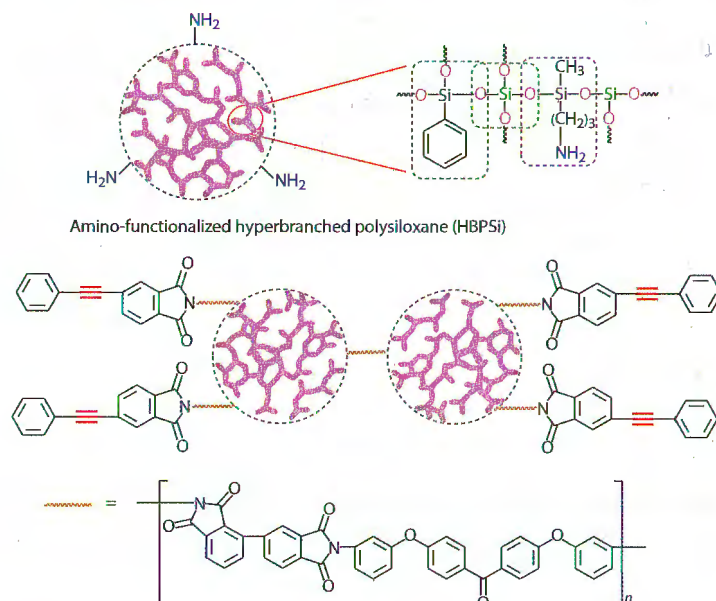
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<https://doi.org/10.1007/s10118-021-2573-4>

Preparation of Low-dielectric Permittivity Polyimide Resins with High Surface Activity from Chemically Bonded Hyperbranched Polysiloxane

Xlu-Ting Li, Xiao-Meng Zhu, Jie Dong, Xin Zhao,
and Qing-Hua Zhang

A series of composite resins were synthesized by introducing amine-functionalized hyperbranched polysiloxane into the backbone of polyimide, which showed excellent processability, high thermal stability, low dielectric constant and better bonding ability, indicating their great potential in radar random composites.

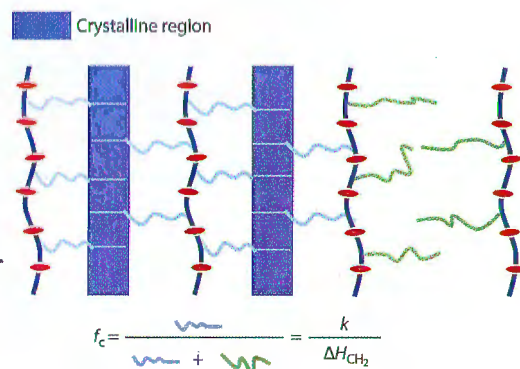


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Limited Fraction of Crystallized Side Chains in Bottlebrush Poly(*n*-alkyl methacrylate)s

Ming-Yue Xiang, Dong Lyu, Ling-Zhi Liu, and Yong-Feng Men

The existence of amorphous regions due to main chain entanglements in bottlebrush polymers requires an introduction of a new parameter f_c , the fraction of crystallizable side chains, to better describe their crystallinity.

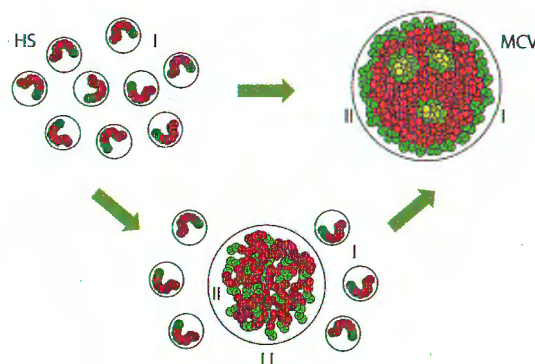


Chinese Journal of Polymer Science, 2021, 39(9), 1211–1216
<https://doi.org/10.1007/s10118-021-2579-y>

Self-assembly of Amphiphilic Diblock Copolymers Induced by Liquid-Liquid Phase Separation

Jia-Lu Bai, Dan Liu, and Rong Wang

The self-assembly of amphiphilic diblock copolymers starting from liquid-liquid phase separation differs from the bilayer membrane closure mechanism starting from homogeneous solution, which contains many metastable states. The nucleation growth mechanism makes the single metastable state and vesicles formed via this path have larger size and cavities during certain stage.



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