

COVER PAPER

Cyclodextrin Molecules, Polymers and Nanomaterials

Jeonghun Lee and Chulhee Kim*

Vol. 29, No. 11, pp 745–760 (2021) | NOV 25, 2021 | DOI 10.1007/s13233-021-9090-8



Cyclodextrins have been widely utilized for myriad applications due to their unique structural features such as hydrophobic cavity for inclusion complex formation and numerous hydroxyl groups for functionalization. Here, we discuss various applications of CD-based molecules, polymers and nanomaterials for pharmaceutical applications, biosensory platforms, self-healing materials, stimuli-responsive hydrogels and drug/gene delivery carriers.

REVIEWS

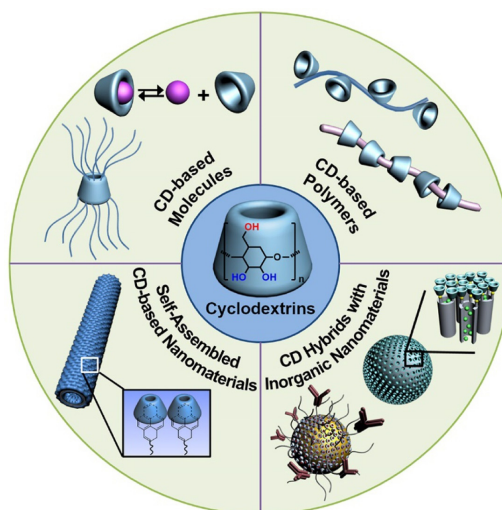
Cyclodextrin Molecules, Polymers and Nanomaterials

Jeonghun Lee and Chulhee Kim*

Macromol. Res., **29**, 745 (2021)

Cover Paper

Cyclodextrins (CDs) have been widely utilized for myriad applications due to their unique structural features such as hydrophobic cavity for inclusion complex formation and numerous hydroxyl groups for functionalization. In this review, we discuss various applications of CD-based molecules, polymers and nanomaterials.



Conductive Polymer Composites for Soft Tactile Sensors

Jongyoun Kim, Hyeonwoo Jung,
Minkyung Kim, Hyejeong Bae,
and Youngu Lee*

Macromol. Res., **29**, 761 (2021)

Current advances in the astounding development of conductive polymer composites (CPCs)-based tactile sensors, including CPCs preparation and device structure designs for tactile sensors to detect various external stimuli were regarded in this review. Such CPCs-based soft tactile sensors will open up new possibilities for human-machine interface communication to address wearable smart devices.



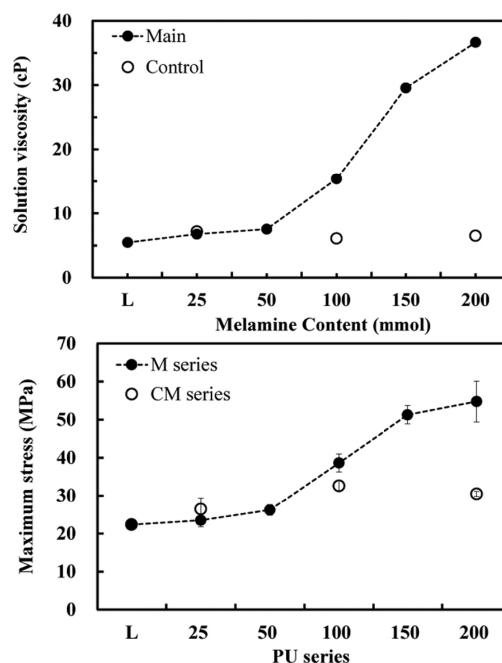
ARTICLES

Enhancement of Tensile Strength and Shape Recovery Characteristics of Grafted Polyurethane Using Melamine as a Crosslinking Agent

Yong-Chan Chung, Ji Eun Park,
Jae Won Choi,
and Byoung Chul Chun*

Macromol. Res., **29**, 776 (2020)

Melamine was grafted to a polyurethane (PU) frame and utilized for crosslinking of PU *via* amino groups. The degree of crosslinking and the solution viscosity increased notably after the grafting melamine due to the formation of crosslinks. Melamine-mediated crosslinking increased not only the breaking tensile stress but also the shape recovery performance of PU. In addition, crosslinked PU was more flexible at low temperature than the unmodified PU. Overall, melamine-mediated crosslinking improved the tensile resistance to stress, the recovery tendency to the initial shape, and the flexibility at cold conditions.

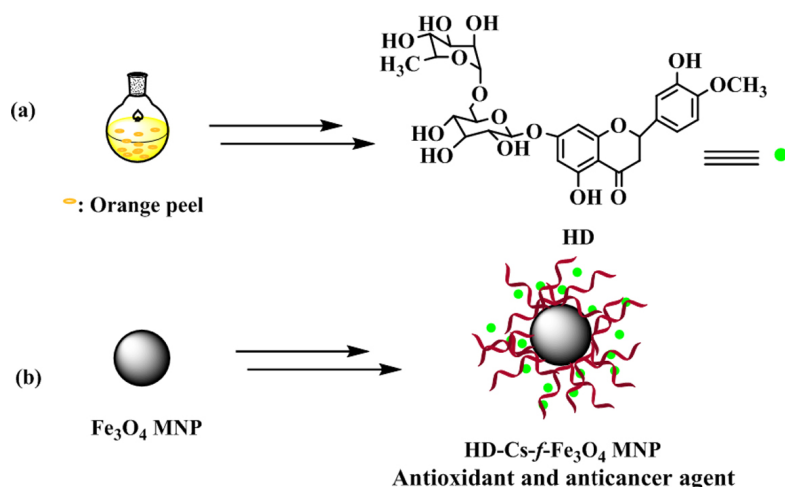


Fabrication of Nanoparticles based on Hesperidin-Loaded Chitosan-Functionalized Fe_3O_4 : Evaluation of *In vitro* Antioxidant and Anticancer Properties

Mahboobeh Zare*,
Malihe Norouzi Sarkati,
and Somayeh Rahaiee

Macromol. Res., **29**, 785 (2021)

Hesperidin (HD) as a flavanone glycoside has pharmacological activities such as anti-inflammatory, antioxidant, and anti-cancer properties. However, poor solubility and bioavailability of hesperidin restrict its therapeutic effects. In this work, chitosan-functionalized Fe_3O_4 magnetic nanoparticles (Cs-*f*- Fe_3O_4 MNPs) were prepared to carry hesperidin. Hesperidin was isolated and purified from orange peel, and then it was efficiently loaded into the synthesized magnetic nanoparticles (HD-Cs-*f*- Fe_3O_4 MNPs). The antioxidant activity of synthesized MNPs was determined by 2,2'-diphenyl-1-picrylhydrazyl (DPPH) free radical method. HD-Cs-*f*- Fe_3O_4 MNPs have exhibited a high DPPH scavenging activity and their antioxidant effect increased as the concentrations increased. The cytotoxicity of prepared MNPs were studied by 3-(4,5-dimethylthiazol-2-yl)-2,5-diphenyl-2H-tetrazolium bromide (MTT) assay. HD-Cs-*f*- Fe_3O_4 MNPs demonstrated a greater toxicity against MCF-7 cells compared to Cs-*f*- Fe_3O_4 MNPs. The toxicity of hesperidin-loaded chitosan-functionalized Fe_3O_4 MNPs against cancerous cells makes them as promising candidates for further studies in the cancer treatment.

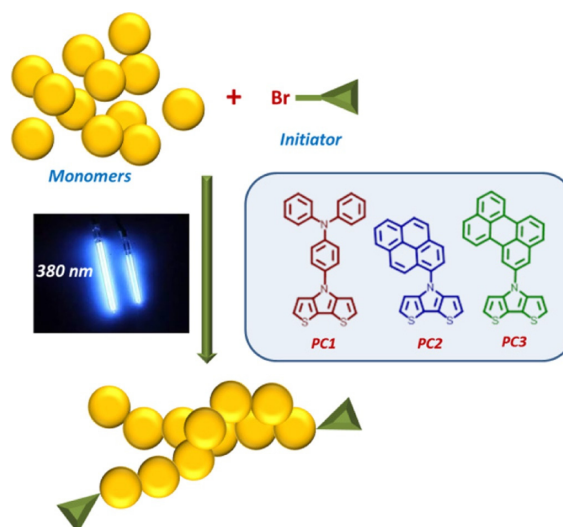


Organic Photocatalysts Based on Dithieno[3,2-b:2',3'-d]pyrrole for Photoinduced Metal-Free Atom Transfer Radical Polymerization

Nhung Thanh Thi Truong,
Tam Huu Nguyen, Bao Kim Doan,
Le-Thu T. Nguyen*,
Tam Hoang Luu, Chau Duc Tran,
Thiet Quoc Nguyen,
and Ha Tran Nguyen*

Macromol. Res., **29**, 791 (2021)

Organic photocatalysts based on dithieno[3,2-b:2',3'-d]pyrrole anchoring triphenyl amine, pyrene or perylene group have been synthesized successfully and applied for the metal-free atom transfer radical polymerization of methyl methacrylate, 2-(dimethylamino)ethyl methacrylate and tert-butyl methacrylate monomers under UV irradiation.

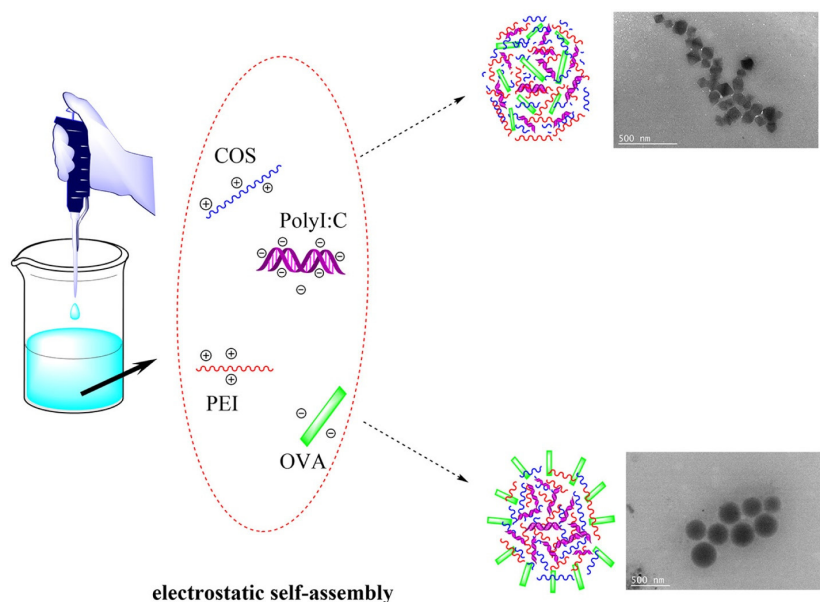


Preparation and Performance Study of COS/PEI@PolyI:C/OVA Nanocomposite Using the Blend System of Chitooligosaccharide and Polyethyleneimine as a Drug Carrier

Kai Zhang, Qian Sun, Xiaoyu Bai, Peng Liu, Zijian LYu, QiuHong Li, and Aixiang Li*

Macromol. Res., **29**, 800 (2021)

Nanoparticles (NPs) COS/PEI-PolyI:C-OVA (CP-P-O) were prepared by electrostatic self-assembly of chitooligosaccharide/polyethyleneimine (COS/PEI) blend system with PolyI:C and ovalbumin (OVA). The process is simple and feasible. The NPs solution was stable. NPs coated PolyI:C and OVA well. NPs had suitable size and promoted the release of mouse tumor necrosis factor α (TNF- α) and mouse interferon- γ (IFN- γ).

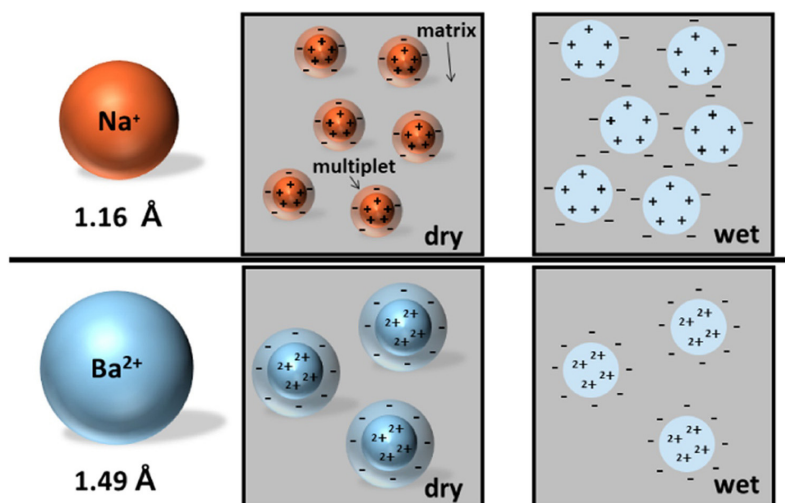


Effects of the Degree of Neutralization and Type of Cations on the Water Absorption Behavior of Styrene-*co*-Methacrylate Ionomers

In-Sub So, Ki-Cheol Song, Yoon-Gwan Jeong, and Joon-Seop Kim*

Macromol. Res., **29**, 810 (2021)

The strength of the interactions between ion pairs determined the size and number of multiplets and affected the mobility of polymer chains emanating from the multiplet and the water absorption behavior of the ionomer. In the case of the divalent ionomer, the ion pair consisted with one cation and two anions, and this type of ion pairing affected the size and number of multiplets and the mobility of polymer chains in the vicinity of the multiplets, and consequently the water absorption of the ionomer.

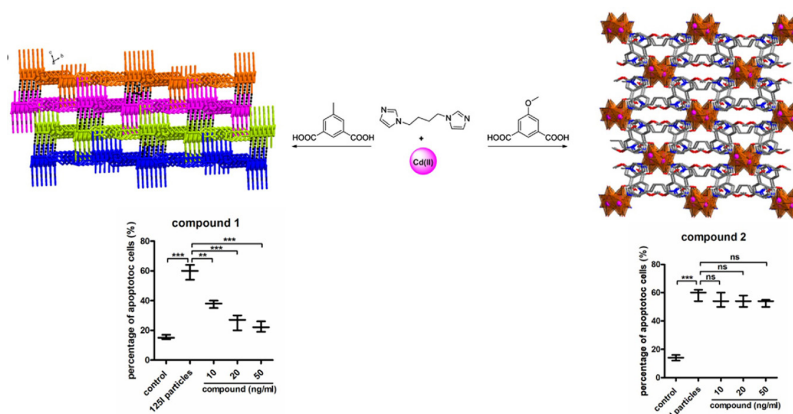


Two Luminescent Cd(II) Coordination Polymers: Enhancement Activity on Pancreatic Cancer Combined with Biliary Stent Placement and 125I Particles

Jie-Peng Jia, Quan Shao, Ying-Kai Wang, Bo Qian, Wen Zhang, Tao Hu, and Ji-Jun Zhang*

Macromol. Res., **29**, 818 (2021)

Two mixed-ligand coordination polymers were prepared and their luminescent performances as well as thermal stability were explored. Furthermore, their anti-pancreatic cancer activity combined with biliary stent placement and 125I particles was evaluated and the specific mechanism was explored as well.

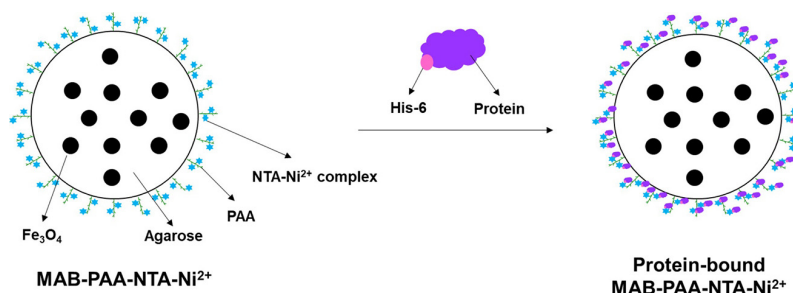


Ni-Chelated Poly(acrylic acid)-Grafted Magnetic Agarose Bead for Affinity-Based Separation of Proteins

So-Yeon Kim, Young Jin Kim, and Hasoo Seong*

Macromol. Res., **29**, 825 (2021)

As an efficient adsorbent for target proteins, brush-type magnetic agarose beads grafted with poly(acrylic acid) and functionalized by binding nitrilotriacetic acid (MAB-PAA-NTA) that forms a chelate with a metal ion was prepared. NTA was bound to the MAB-PAA prepared by grafting acrylic acid onto the MAB surface using ceric ammonium nitrate (CAN) to have coordination binding ability to Ni^{2+} . His-tagged ubiquitin was readily isolated by the MAB-PAA-NTA- Ni^{2+} and purified using a permanent magnet with high efficiency.



「Macromolecular Research」목차

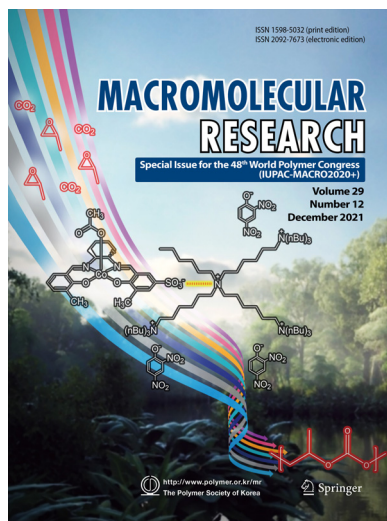
- Special Issue for the 48th World Polymer Congress (IUPAC-MACRO2020+) 정기간행영문지_ 29권 12호 · 2021년 12월

COVER PAPER

CO₂/Propylene Oxide Copolymerization with a Bifunctional Catalytic System Composed of Multiple Ammonium Salts and a Salen Cobalt Complex Containing Sulfonate Anions

Yeong Hyun Seo, Yong Bin Hyun, Hyun Ju Lee, Hong Cheol Lee, Jung Hyun Lee, Sun Mi Jeong, and Bun Yeoul Lee*

Vol. 29, No. 12, pp 855–863 (2021) | DEC 25, 2021 | DOI 10.1007/s13233-021-9094-4



Multiple ammonium salts containing 2–5 quaternary ammonium salt units and (Salen)Co(III) complexes containing one or two $\text{SO}_3^- [\text{PhNH}_3]^+$ moieties were prepared, a combination of which showed high activity for CO₂/propylene oxide (PO) copolymerization (TOF, 1500–4500 h⁻¹)

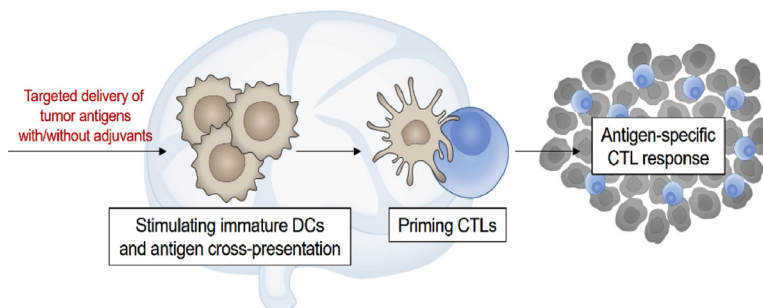
REVIEW

Biomaterials as Antigen Delivery Carrier for Cancer Immunotherapy

Wooram Um, Anuradha Gupta, Seok Ho Song, Chan Ho Kim, and Jae Hyung Park*

Macromol. Res., **29**, 834 (2021)

In recent, numerous efforts have been made to harness biomaterials for the targeted or sustained delivery of tumor-associated antigens to antigen-presenting cells for enhanced cancer immunotherapy. In this review, we highlight recent advances in the development of biomaterials to deliver tumor-associated antigens and their therapeutic potential for cancer treatment.



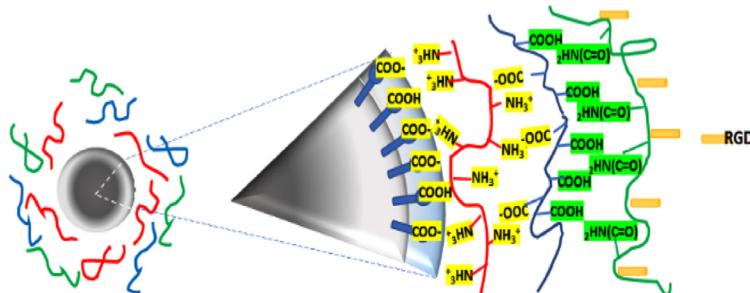
COMMUNICATIONS

Functional Polyelectrolyte Coatings on Polymeric and Magnetic Colloidal Particles for Antifouling and Non-Toxic Bioconjugate Nanoparticles

Nguyen Thi Thuy Chau,
Eun-Seo Koh, Su-Jin Lee, Zhou Rui,
and Sung Yun Yang*

Macromol. Res., **29**, 843 (2021)

We created H-bond and electrostatic combinative polyelectrolyte multilayer (PEM) coatings on magnetic colloidal particles to prevent irreversible coagulation and introduce biochemical moieties. Furthermore, through the chemical groups of the PEM coating, the RGD-peptide ligand-introduced magnetic particles exhibit strong specific cell-magnetic particle interactions. Thus, these functional PEM coatings on magnetic colloidal particles may have great potential in bio-applications, including targeted intracellular drug delivery.

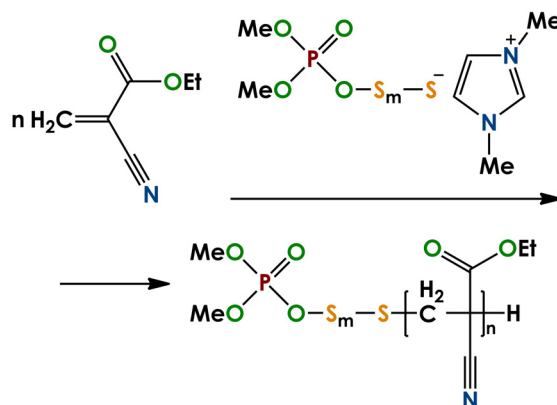


Anionic Polymerization of Ethyl 2-Cyanoacrylate Initiated by 1,3-Dimethylimidazolium (phosphonooxy-)oligosulfanide

Natalia Tarasova, Efrem Krivoborodov,
Alexey Zanin*, Ilya Toropygin,
Ekaterina Pascal, Valerie Dyatlov,
and Yaroslav Mezhuiev

Macromol. Res., **29**, 847 (2021)

The possibility of initiating anionic polymerization in the presence of ionic liquid 1,3-dimethylimidazolium (phosphonooxy-)oligosulfanide is shown by the example of the synthesis of poly(ethyl 2-cyanoacrylate). The presence of sulfur and phosphorus atoms in the terminal group confirms the initiation of anionic polymerization as a result of nucleophilic attack by (phosphonooxy-)oligosulfanide- anion by electrophilic ethyl 2-cyanoacrylate.



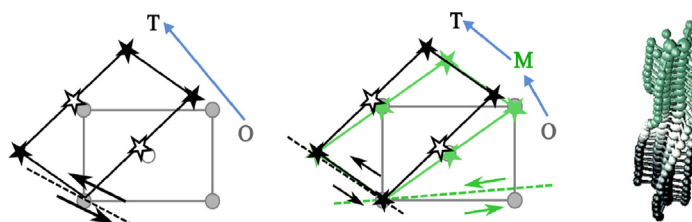
ARTICLES

Monoclinic Phase and Competition Between Transformation Modes in the Phase Transition Between Orthorhombic and Triclinic Phases of Crystalline Polyethylene

Ivan A. Strel'nikov
and Elena A. Zubova*

Macromol. Res., **29**, 851 (2021)

The transition from orthorhombic (O) to triclinic (T) phase under load goes through an intermediate monoclinic (M) phase. The reason is that the transformation mode from the O to the M phase has a very small magnitude and is actuated before the magnitude of the shear strain reaches the value needed to actuate the direct transition from the O to the T phase. The O to M transition is executed by short twist defects diffusing along the chains.



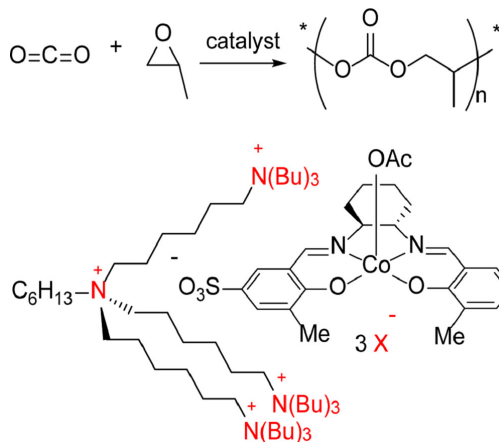
CO₂/Propylene Oxide Copolymerization with a Bifunctional Catalytic System Composed of Multiple Ammonium Salts and a Salen Cobalt Complex Containing Sulfonate Anions

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Macromol. Res., **29**, 855 (2021)

Cover Paper

Multiple ammonium salts containing 2–5 quaternary ammonium salt units and (Salen)Co(III) complexes containing one or two $-\text{SO}_3^- [\text{PhNH}_3]^+$ moieties were prepared, a combination of which showed high activity for CO₂/propylene oxide (PO) copolymerization (TOF, 1500–4500 h⁻¹).

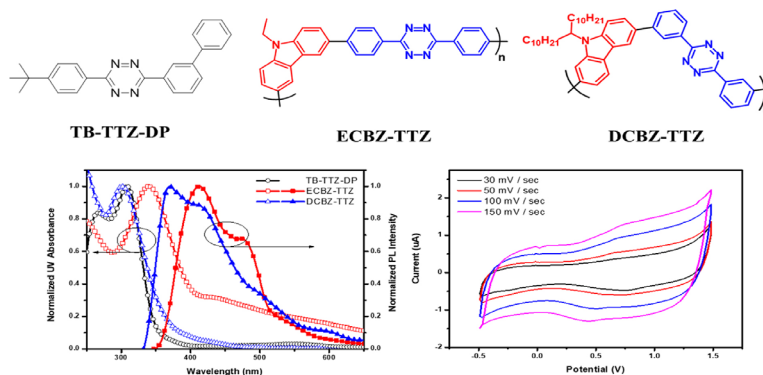


Synthesis and Electro-Optical Properties of a New Conjugated Polymer Based on a Tetrazine Moiety for Solution-Processed Devices

Dong Joo Min, Raveendra Jillella,
Sangshin Park, Seokwoo Kang,
Soo Young Park, and Jongwook Park*

Macromol. Res., **29**, 864 (2021)

A new donor–acceptor type polymer was successfully synthesized using a tetrazine moiety. Poly(9-ethyl-3-(4-(6-phenyl-1,2,4,5-tetrazin-3-yl)phenyl)-9H-carbazole) (ECBZ-TTZ) and poly(9-(henicosan-11-yl)-3-(3-(6-phenyl-1,2,4,5-tetrazin-3-yl)phenyl)-9H-carbazole) (DCBZ-TTZ) are advanced functional polymers with excellent optical and electrical properties, so they can be used in various optoelectronic fields.

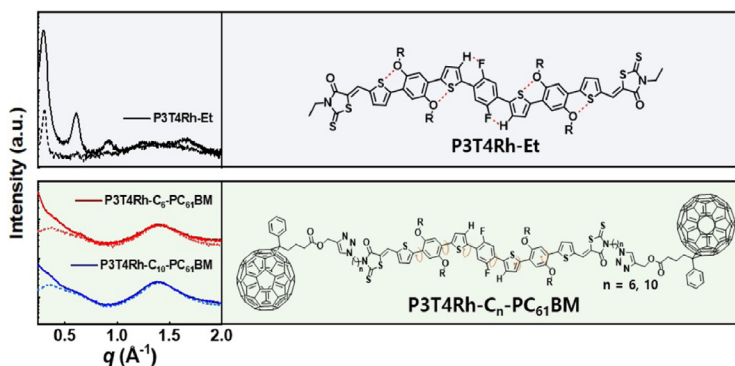


Fullerene-Based Photoactive A–D–A Triads for Single-Component Organic Solar Cells: Incorporation of Non-Fused Planar Conjugated Core

Young Woong Lee, Jiwoo Yeop,
Jin Young Kim*, and Han Young Woo*

Macromol. Res., **29**, 871 (2021)

Two acceptor–donor–acceptor single-component (SC) photovoltaic triad molecules, P3T4Rh-C₆-PC₆₁BM and P3T4Rh-C₁₀-PC₆₁BM, were synthesized utilizing the conformation-locked planar conjugated core with intrachain noncovalent coulombic interactions. The photoelectrical properties of SC organic solar cells were investigated in terms of core design and thin film morphology of SC materials.

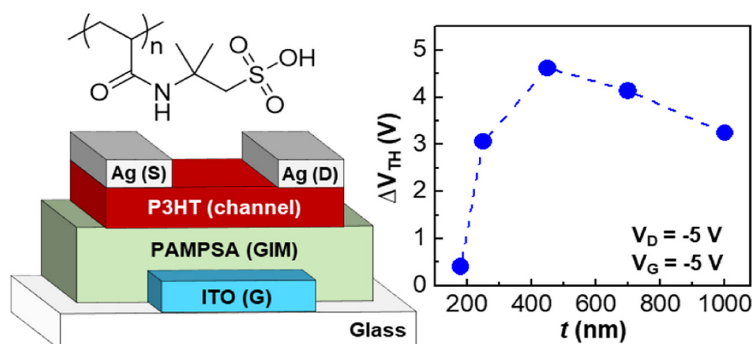


Thickness Effect of Polar Polymer Films on the Characteristics of Organic Memory Transistors

Chulyeon Lee, Woongki Lee,
Hwajeong Kim, and Youngkyoo Kim*

Macromol. Res., **29**, 882 (2021)

Organic memory transistors with the poly(2-acrylamido-2-methyl-1-propanesulfonic acid) (PAMPSA) layers were fabricated by varying the PAMPSA thickness. The best hysteresis characteristics were achieved at $t = 450$ nm, which resulted in excellent memory retention performances.

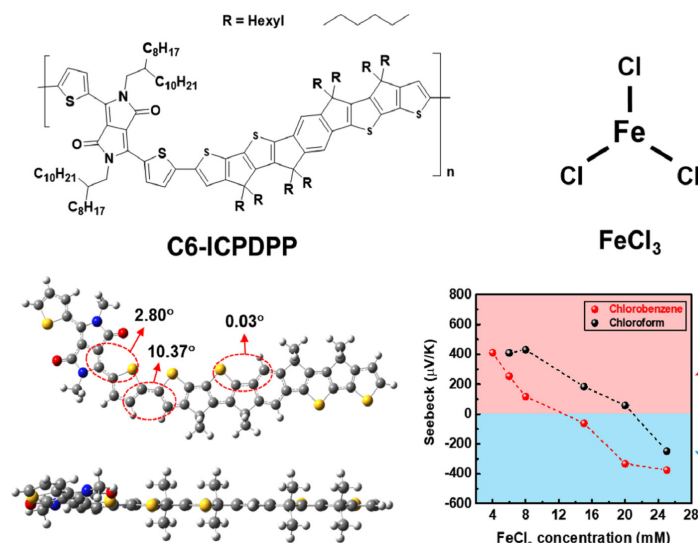


Doping and Thermoelectric Behaviors of Donor-Acceptor Polymers with Extended Planar Backbone

Taek Seong Lee, Su Bin Lee,
Do-Yeong Choi, Eui Hyun Suh,
Tae Kyu An, Yong Jin Jeong*,
Jaeyoung Jang*, and Yun-Hi Kim*

Macromol. Res., **29**, 887 (2021)

A donor-acceptor conjugated polymer, C6-ICPDPP, is designed for organic thermoelectrics and comprises a combination of heterocyclic compounds in the polymer contributes to the extended planar backbone. The C6-ICPDPP showed different structural behavior depending on two types of solvents with different boiling points and exhibited both p- and n-type thermoelectric performances with FeCl_3 doping. This study provides a novel design strategy for D-A polymers suitable for organic thermoelectrics.



Silk Sericin-Polyethyleneimine Hybrid Hydrogel with Excellent Structural Stability for Cr(VI) Removal

Subin Oh, Jungkyu Kim, YunJin Kim,
Subong Park, Hyoung-Joon Jin*,
and Hyo Won Kwak*

Macromol. Res., **29**, 895 (2021)

The introduction of polyethyleneimine (PEI) into a sericin hydrogel increased the Cr(VI) adsorption capacity by more than 350% and compressive strength by more than 400%. PEI, a cationic polymer, imparted excellent structural stability of SS-PEI hydrogel owing to the synergistic effect of electrostatic attraction and chemical crosslinking, and potential as a sericin-based adsorbent for anionic contaminants.

