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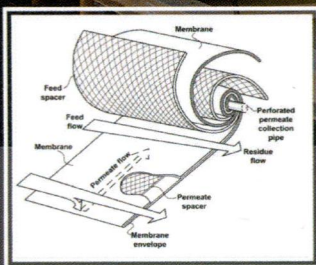
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Number 20

Macromolecules

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Spiral-Wound Module



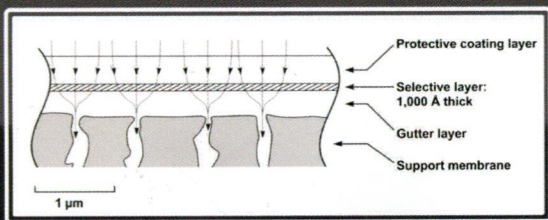
Future Applications
Ethanol/H₂O
Vapor/Vapor

Spectrum of Membrane Materials



Emerging
Olefin/Paraffin
CO₂/N₂
CO₂/H₂, H₂/CO₂
O₂/Air

Composite Membrane



Current
CO₂/CH₄
Vapor/Air
N₂/Air



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ON THE COVER: Membrane gas separation is now a well-established and growing area of technology. Development of higher selectivity and higher permeance membranes could lead to significant new applications. This paper analyzes the barriers that have inhibited the development of these membranes. We start by reviewing the lessons that can be drawn from the past. We then review the needs and the most promising research directions for new materials in current and future membrane applications. See page 6999.

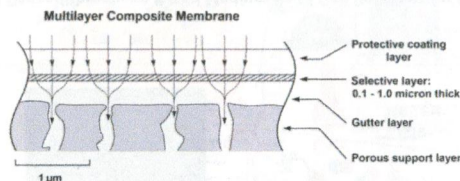
Perspective

6999

Gas Separation Membrane Materials: A Perspective

Richard W. Baker and Bee Ting Low*

[dx.doi.org/10.1021/ma501488s](https://doi.org/10.1021/ma501488s)



Articles

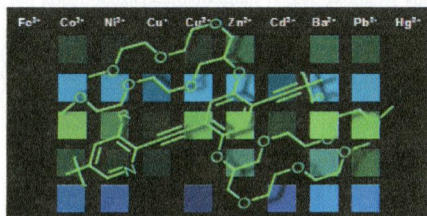
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Syntheses and Characteristics of Water-Soluble, Pyridine-Based Poly(aryleneethynylene)s

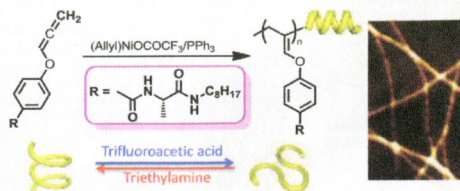
Kai Seehafer, Markus Bender, S. Thimon Schwaebel, and Uwe H. F. Bunz*

[dx.doi.org/10.1021/ma5018296](https://doi.org/10.1021/ma5018296)



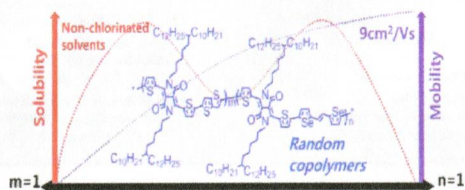
Synthesis and Chiroptical Properties of Helical Polyallenes Bearing Chiral Amide Pendants

Yuan-Yuan Zhu, Ting-Ting Yin, Xue-Liang Li, Ming Su, Ya-Xin Xue, Zhi-Peng Yu, Na Liu,* Jun Yin, and Zong-Quan Wu*



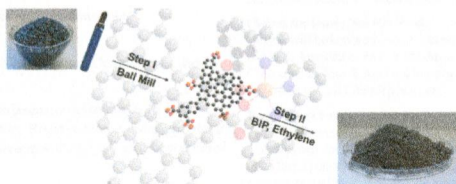
Comparative Studies on the Relations between Composition Ratio and Charge Transport of Diketopyrrolopyrrole-Based Random Copolymers

Hui-Jun Yun, Jangwhan Cho, Dae Sung Chung,* Yun-Hi Kim,* and Soon-Ki Kwon*



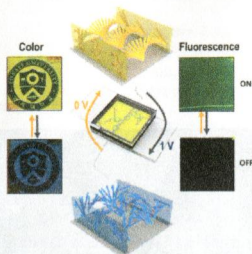
Mechanochemical Route to Graphene-Supported Iron Catalysts for Olefin Polymerization and in Situ Formation of Carbon/Polyolefin Nanocomposites

F. Beckert, S. Bodendorfer, W. Zhang, R. Thomann, and R. Mülhaupt*



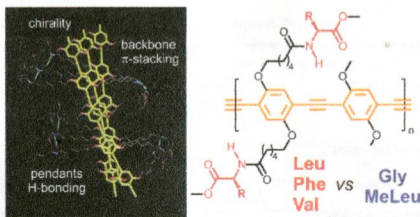
Electrical Chiral Assembly Switching of Soluble Conjugated Polymers from Propylenedioxythiophene-Phenylene Copolymers

Xu Yang, Seogjae Seo, Chihyun Park, and Eunyoung Kim*



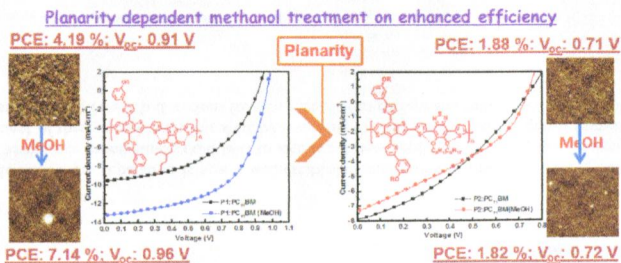
Natural α -Amino Acid-Functionalized Poly(phenyleneethynylene)s (PPEs): Synthesis and Chiroptical Characterization of Aggregate States

Claudio Resta, Gennaro Pescitelli,* and Lorenzo Di Bari*



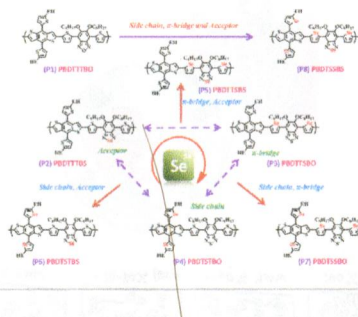
Alkoxyphenylthiophene Linked Benzodithiophene Based Medium Band Gap Polymers for Organic Photovoltaics: Efficiency Improvement upon Methanol Treatment Depends on the Planarity of Backbone

Kakaraparathi Kranthiraja, Kumarasamy Gunasekar, Woosum Cho, Myungkwan Song, Young Geun Park, Jin Yong Lee, Yurim Shin, In-Nam Kang, Ajeong Kim, Hyunjung Kim, BongSoo Kim,* and Sung-Ho Jin*



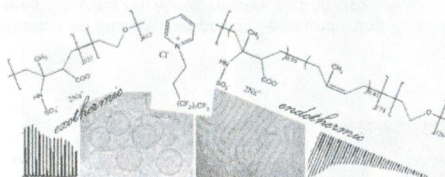
Location and Number of Selenium Atoms in Two-Dimensional Conjugated Polymers Affect Their Band-Gap Energies and Photovoltaic Performance

Jian-Ming Jiang, Putikam Raghunath, Hsi-Kuei Lin, Yu-Che Lin, M. C. Lin, and Kung-Hwa Wei*



Morphologically Tunable Coassembly of Double Hydrophilic Block Polyelectrolyte with Oppositely Charged Fluorosurfactant

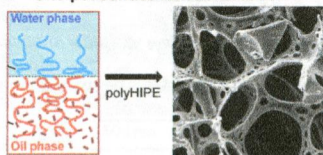
Mariusz Uchman,* Stergios Pispas, Lubomír Kováčik, and Miroslav Štěpánek



3D Surface Functionalization of Emulsion-Templated Polymeric Foams

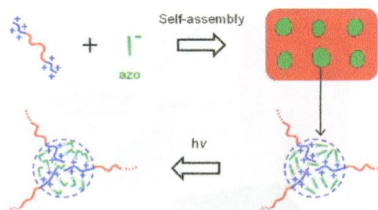
Priyakshmi Viswanathan, David W. Johnson, Claire Hurley, Neil R. Cameron, and Giuseppe Battaglia*

One-pot surface functionalization



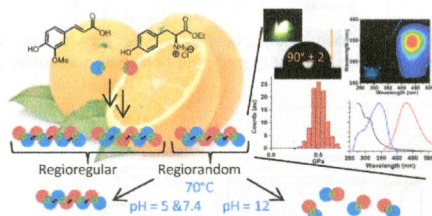
A Supramolecular Approach to Photoresponsive Thermo/Solvoplastic Block Copolymer Elastomers

Xin Wang, Jaana Vapaavuori, Yue Zhao, and C. Geraldine Bazuin*



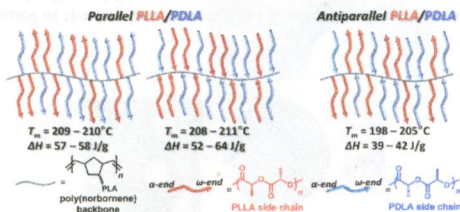
Poly(ferulic acid-co-tyrosine): Effect of the Regiochemistry on the Photophysical and Physical Properties en Route to Biomedical Applications

Amandine Noel, Yannick P. Borguet, Jeffery E. Raymond, and Karen L. Wooley*



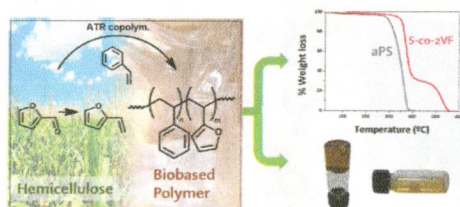
Stereoblock-like Brush Copolymers Consisting of Poly(L-lactide) and Poly(D-lactide) Side Chains along Poly(norbornene) Backbone: Synthesis, Stereocomplex Formation, and Structure–Property Relationship

Takuya Isono, Yohei Kondo, Shun Ozawa, Yougen Chen, Ryosuke Sakai, Shin-ichiro Sato, Kenji Tajima, Toyoji Kakuchi, and Toshifumi Satoh*



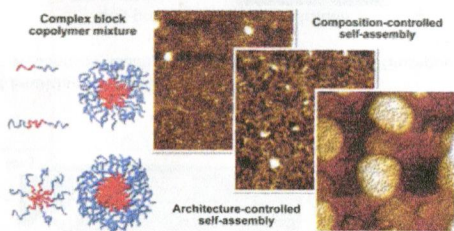
ATR Copolymerization of Styrene with 2-Vinylfuran: An Entry to Functional Styrenic Polymers

Sheila Ortega Sánchez, Francesco Marra, Angela Dibenedetto, Michele Aresta, and Alfonso Grassi*



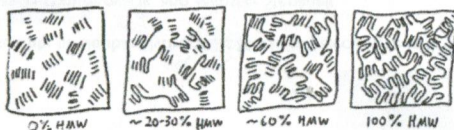
Control of Self-Assembled Structure through Architecturally and Compositionally Complex Block Copolymer Surfactant Mixtures

Xu Wang, Jesse L. Davis, Juan Pablo Hinestrosa, Jimmy W. Mays, and S. Michael Kilbey II*



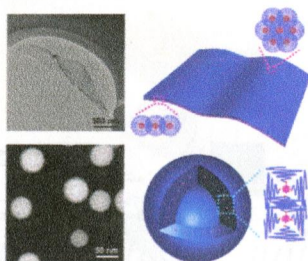
Role of Molecular Weight Distribution on Charge Transport in Semiconducting Polymers

Scott Himmelberger, Koen Vandewal, Zhuping Fei, Martin Heeney, and Alberto Salleo*



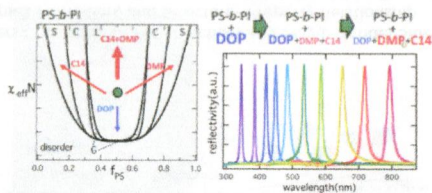
Self-Assembly of Polyoxometalate-Based Starlike Polymers in Solvents of Variable Quality: From Free-Standing Sheet to Vesicle

Yin Liao, Nijuan Liu, Qian Zhang, and Weifeng Bu*



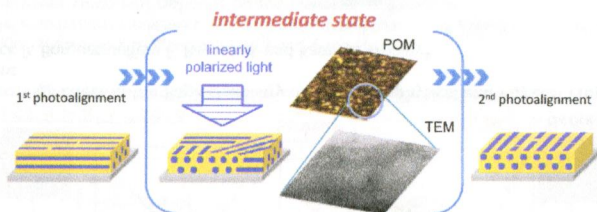
Tunable Photonic Crystals: Control of the Domain Spacings in Lamellar-Forming Diblock Copolymers by Swelling with Immiscible Selective Solvents and a Neutral Solvent

Akifumi Matsushita and Shigeru Okamoto*

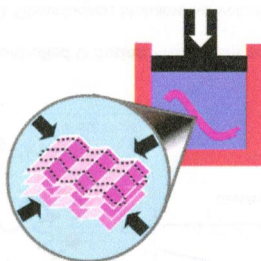


Pathways toward Photoinduced Alignment Switching in Liquid Crystalline Block Copolymer Films

Masami Sano, Shiyuko Nakamura, Mitsuo Hara, Shusaku Nagano,* Yuya Shinohara, Yoshiyuki Amemiya, and Takahiro Seki*

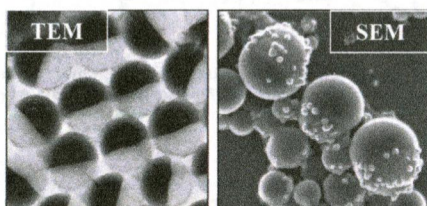


Determination of Silkworm Silk Fibroin Compressibility Using High Hydrostatic Pressure with in Situ X-ray Microdiffraction
 Christina Krywka,* Igor Krasnov, Roxana Figuli, Manfred Burghammer, and Martin Müller



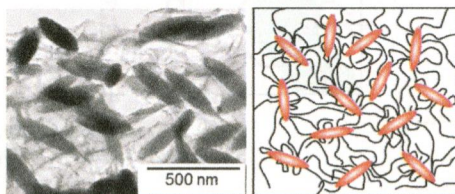
Polymer Janus Nanoparticles with Two Spatially Segregated Functionalizations

Markus Urban, Birger Freisinger, Omayma Ghazy, Roland Staff, Katharina Landfester, Daniel Crespy, and Anna Musyanovych*



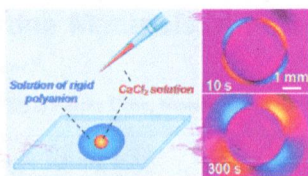
Covalent Ferrohydrogels Based on Elongated Particulate Cross-Linkers

L. Roeder, M. Reckenthäler, L. Belkoura, S. Roitsch, R. Strey, and A. M. Schmidt*



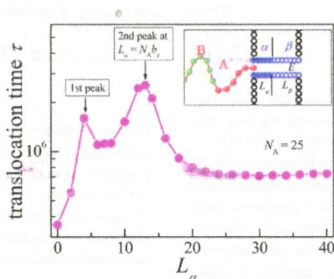
In Situ Observation of Ca^{2+} Diffusion-Induced Superstructure Formation of a Rigid Polyaniion

Zi Liang Wu, Riku Takahashi, Daisuke Sawada, Md. Arifuzzaman, Tasuku Nakajima, Takayuki Kurokawa, Jian Hu, and Jian Ping Gong*



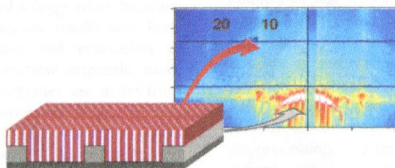
Translocation of Diblock Copolymer through Compound Channels: A Monte Carlo Simulation Study

Chao Wang, Ying-Cai Chen, Shuang Zhang, and Meng-Bo Luo*



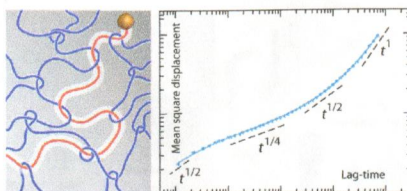
Probing Self-Assembly of Cylindrical Morphology Block Copolymer Using in Situ and ex Situ Grazing Incidence Small-Angle X-ray Scattering: The Attractive Case of Graphoepitaxy

Mireille Maret,* Raluca Tiron,* Xavier Chevalier, Patrice Gergaud, Ahmed Gharbi, Céline Lapeyre, Jonathan Pradelles, Vincent Jousseau, Guillaume Fleury, Georges Hadziioannou, Nathalie Boudet, and Christophe Navarro



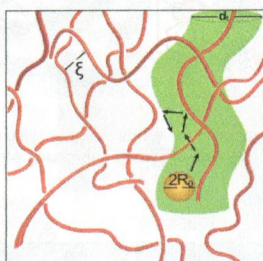
Translational and Reorientational Dynamics of Entangled DNA

Zongying Gong and Johan R. C. van der Maarel*



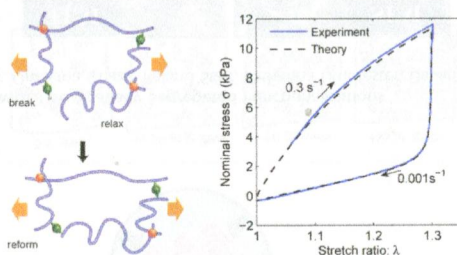
Size Effect of Nanoparticle Diffusion in a Polymer Melt

Christopher A. Grabowski and Ashis Mukhopadhyay*



Time Dependent Behavior of a Dual Cross-Link Self-Healing Gel: Theory and Experiments

Rong Long, Koichi Mayumi, Costantino Creton, Tetsuharu Narita, and Chung-Yuen Hui*



Additions and Corrections

Correction to Supramolecular Interaction Controlled Diffusion Mechanism and Improved Mechanical Behavior of Hybrid Hydrogel Systems of Zwitterions and CNT

Saud Hashmi, Amin GhavamiNejad, Francis O. Obiweleuzor, Mohammad Vatankehah-Varnoosfaderani, and Florian J. Stadler*

Correction to Dissipative Particle Dynamics Study of Electrostatic Self-Assembly in Aqueous Mixtures of Copolymers Containing One Neutral Water-Soluble Block and One Either Positively or Negatively Charged Polyelectrolyte Block
Karel Šindelka, Zuzana Limpouchová, Martin Lísal, and Karel Procházka*