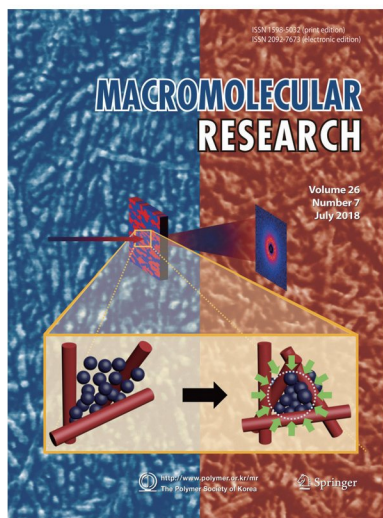


COVER PAPER

Significance of Polymeric Nanowire–Network Structures for Stable and Efficient Organic Solar Cells

Jongkuk Ko, Jiyeon Song, Won Tae Choi, Tae-Hwan Kim, Young-Soo Han, Jeewoo Lim*, Changhee Lee*, and Kookheon Char*

Vol. 26, No. 7, pp 623–629 (2018) | JUL 25, 2018 | DOI 10.1007/s13233-018-6088-y



Thermal annealing of poly(3-hexylthiophene-2,5-diyl) (P3HT) nanowires led to the formation of nanowire network structures confirmed through small angle neutron scattering (SANS) measurements. The physically interconnected network structures form robust electron donor domains and impose confinement which suppresses the aggregation of the electron acceptor, [6,6]-phenyl-C61-butyric acid methyl ester (PCBM). Organic solar cells having the nanowire network structures showed increased power conversion efficiencies and dramatically enhanced thermal stability compared to bulk heterojunction (BHJ) and non-network nanowire-based devices.

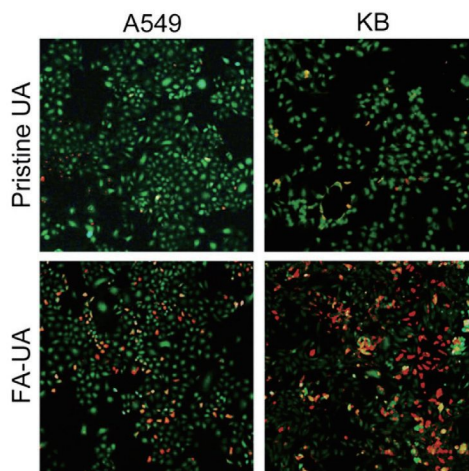
COMMUNICATIONS

Electrosprayed Folic Acid-Conjugated Ursolic Acid Nanoparticles for Tumor Therapy

Guk Young Ahn, Dong-Hyun Paik, Ki-Young Jeong, Seung-Woon Baek, Rae-Hyoung Kang, Eun Seong Lee, and Sung-Wook Choi*

Macromol. Res., 26, 573 (2018)

We prepared folic acid (FA)-conjugated ursolic acid (UA) nanoparticles using an electrospraying approach and demonstrated their superior cellular uptake and cytotoxicity in KB cells compared to pristine UA and nanosized UA particles for tumor therapy.

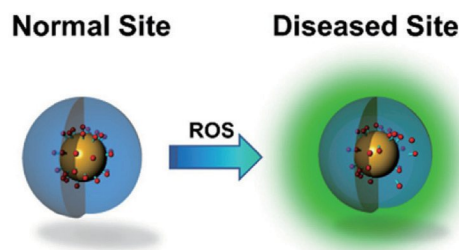


PEGylated Gold Nanoprobe Bearing the Diselenide Bond for ROS-Responsive Fluorescence Imaging

Veerasikku Gopal Deepagan,
E. K. Pramod Kumar,
Yung Doug Suh,
and Jae Hyung Park*

Macromol. Res., **26**, 577 (2018)

We developed a selective H_2O_2 concentration-dependent *on-off* gold nanoprobe and confirmed its *in vitro* fluorescence imaging application using activated macrophages cells. The nanoprobe was inactive in H_2O_2 -deficient conditions due to fluorescence resonance energy transfer-based quenching. Once the nanoprobe was exposed to an H_2O_2 -rich environment, it was activated by diselenide bond dissociation, resulting in fluorescence dequenching.



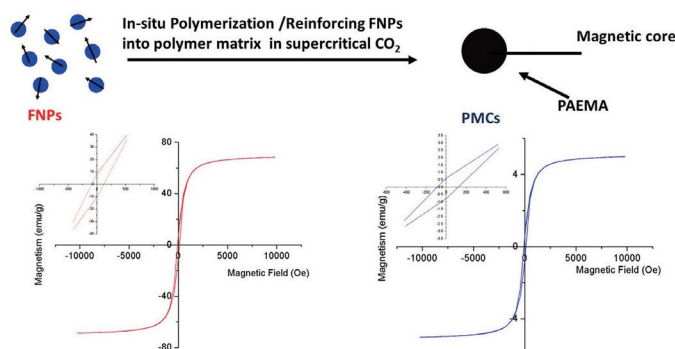
ARTICLES

***In vivo* Acute Cytotoxicity Study of Poly(2-amino ethyl methacrylate-co-methylene bis-acrylamide) Magnetic Composite Synthesized in Supercritical CO_2**

Gunjan Bisht*, M. G. H. Zaidi,
and Bi-lab KC

Macromol. Res., **26**, 581 (2018)

Illustration of polymeric magnetic composites (PMCs) synthesis through *in situ* polymerization of 2-amino ethyl methacrylate (AEMA) in presence of ferrite nanoparticles (FNPs) using supercritical CO_2 . Magnetic properties of FNPs before and after polymerization were changed and lower saturation magnetization was found in PMCs compared to FNPs due to polymer surface coating.

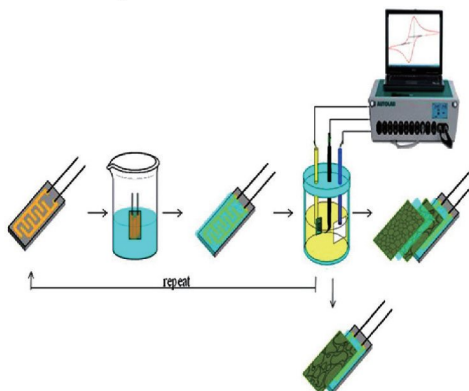


Multilayer-Structured Poly-Vanadium Acid/Polyaniline Composite: Synthesis and Properties for Humidity Sensing

Li Li*, Yanan Guo, Chao Zhao,
and Liyuan Song

Macromol. Res., **26**, 592 (2018)

Multilayer-structured poly-vanadium acid/polyaniline (V/PANI) composite was successfully synthesized. Two-layer-structured V/PANI composite was fabricated by dip-coating poly-vanadium acid and electrochemically polymerizing PANI onto interdigitated gold electrode in sequence, then the process could be repeated to prepare the second two-layer-structured V/PANI composite. The sensing property and mechanism of humidity sensors based on the multilayer-structured V/PANI composite were investigated in details. The good humidity sensing characteristics of the composite sensor might relate to the special multilayer-structured configuration. Both PANI and the poly-vanadium acid play an important role in realizing good humidity sensing properties of the composite.

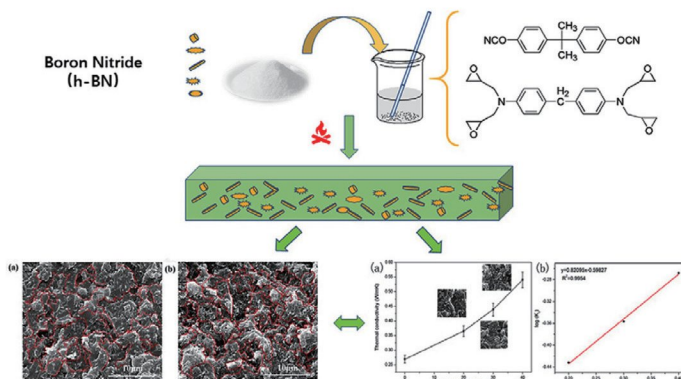


Design of h-BN-Filled Cyanate/Epoxy Thermal Conductive Composite with Stable Dielectric Properties

Yangxue Lei, Zengmao Han,
Dengxun Ren, Hai Pan,
Mingzhen Xu*, and Xiaobo Liu*

Macromol. Res., 26, 602 (2018)

Hexagonal boron nitride (h-BN) was introduced into cyanate/epoxy matrix and the thermally conductive composites with stable dielectric properties were obtained. Results indicated that the h-BN dominated the formation of the thermal conductive channels. Thus, with increasing the content of h-BN, the thermal conductivity increased. Due to the stable dielectric properties of h-BN itself and the thermal stability of the cyanate/epoxy matrix, the composites with h-BN showed a stable dielectric constant and loss both as function of the frequency and temperature.

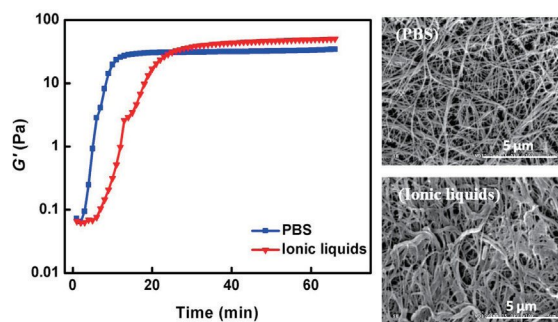


Effect of Ionic Liquids on the Fibril-Formation and Gel Properties of Grass Carp (*Ctenopharyngodon idellus*) Skin Collagen

Zhongwei Zhai, Haibo Wang*,
Benmei Wei*, Peiwen Yu,
Chengzhi Xu, Lang He,
Juntao Zhang, and Yuling Xu

Macromol. Res., 26, 609 (2018)

The influence of ionic liquids on the fibril-formation and gel properties of fish-sourced collagen was investigated. The rate of collagen fibrillogenesis was suppressed and the diameter of resulting collagen fibrils was enlarged by the introduction of ionic liquids (ILs). In addition, the thermal stability of collagen fibril significantly enhanced when self-assembled in the presence of ILs. Furthermore, the self-assembled collagen gels in the presence of ILs exhibited better mechanical strength.

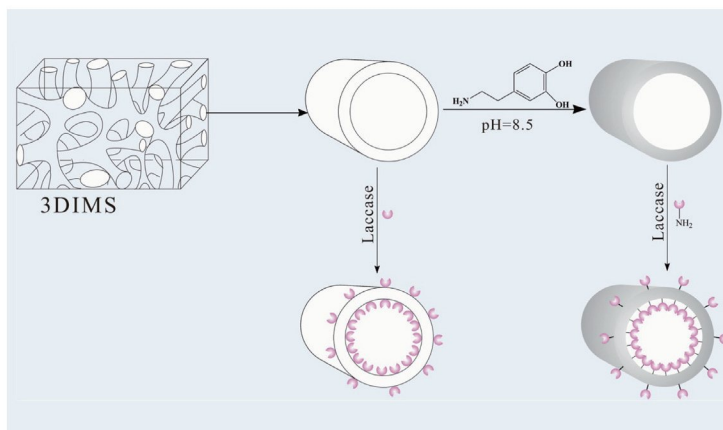


Preparation of Polydopamine-Modified 3D Interconnected Macroporous Silica for Laccase Immobilization

Dali Cao, Wenjing Cheng, Kai Tao,
and Yunxiao Liang*

Macromol. Res., 26, 616 (2018)

Polydopamine-modified three-dimensional interconnected macroporous silica (PDA/3DIMS) has been developed to immobilize enzyme. The properties of immobilized laccase were enhanced significantly than the free laccase. The millimeter-sized biocatalyst exhibited excellent separation and recycling.



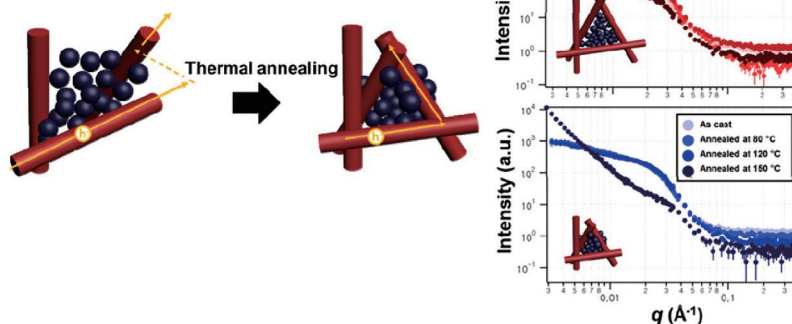
Significance of Polymeric Nanowire-Network Structures for Stable and Efficient Organic Solar Cells

Jongkuk Ko, Jiyun Song,
Won Tae Choi, Tae-Hwan Kim,
Young-Soo Han, Jeewoo Lim*,
Changhee Lee*,
and Kookheon Char*

Macromol. Res., **26**, 623 (2018)

Cover Paper

In this study, we observed the formation of network structures of poly(3-hexylthiophene-2,5-diyl) nanowires by thermal treatment and analyzed the effects of nanowire network structures on the electrical properties, power conversion efficiencies, and thermal stability of the resulting photovoltaic devices. Employing polymeric nanowire and their network structures is a promising strategy to realize stable and efficient organic solar cells.

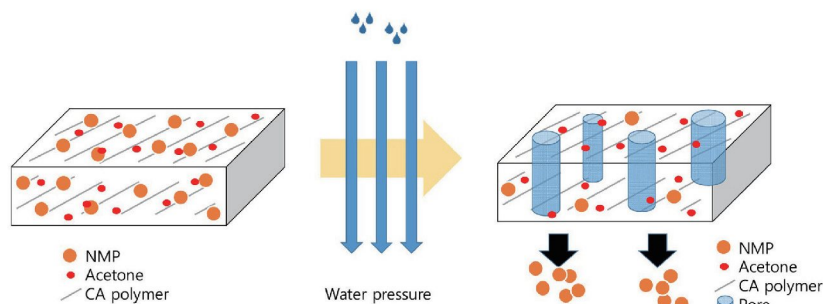


Porous Cellulose Acetate by Specific Solvents with Water Pressure Treatment for Applications to Separator and Membranes

Woong Gi Lee, Do Young Kim,
and Sang Wook Kang*

Macromol. Res., **26**, 630 (2018)

A method to generate pores in the cellulose acetate (CA) polymer without the use of inorganic additives was suggested. The CA membrane containing *N*-methyl pyrrolidinone (NMP) was fabricated by a drying process by taking advantage of the difference between the vapor pressures of NMP and acetone. The presence of NMP molecules in the CA polymer led to an increase in the plasticization effect. Thus, the CA region weakened by NMP molecules could be exposed by water pressure, producing a porous region. Furthermore, the pore size and porosity could be easily controlled by the amount of NMP in the CA polymer and the water pressure.

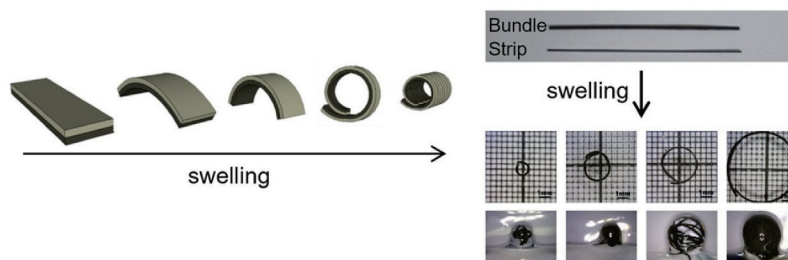


Fabrication of Radiopaque Poly(vinyl alcohol) Hydrogel Bilayers for Use as Embolization Coils

Tae Hoon Lee, Tae Yang Kim,
Kyeihan Rhee, and Jae Young Jho*

Macromol. Res., **26**, 634 (2018)

Polymeric embolization coils were fabricated in the form of bilayer with poly(vinyl alcohol) hydrogel films containing tantalum particles. The diameter of the coils was controlled by expansion ratio of the hydrogel films, which were regulated by the crosslinking density of the polymer. In the occlusion test with glass models approximating brain aneurysms, packing density much higher than that of platinum coils was achieved with the polymer coils fabricated.

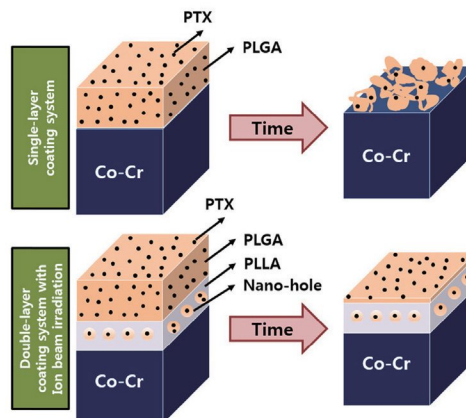


Dual-Layer Coated Drug-Eluting Stents with Improved Degradation Morphology and Controlled Drug Release

Tarek M. Bedair, Wooram Park,
Bang-Ju Park, Myoung-Woon Moon,
Kwang-Ryeol Lee, Yoon Ki Joung*,
and Dong Keun Han*

Macromol. Res., **26**, 641 (2018)

The single-layer coating model suffers from coating instability and uncontrolled degradation behavior. On the other side, the double-layer coating model presented stable property with smooth surface during degradation.

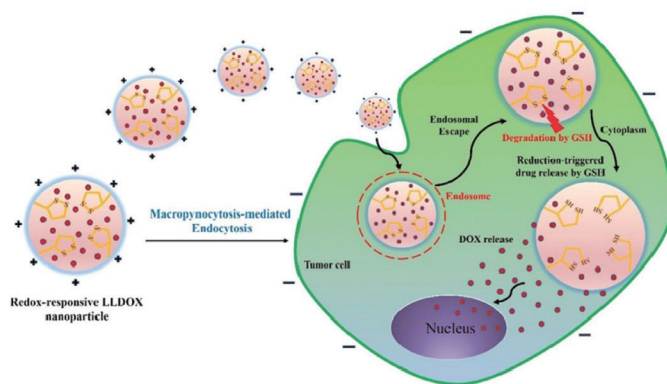


Anticancer Effect of Intracellular-Delivered Doxorubicin Using a Redox-Responsive LMWSC-g-Lipoic Acid Micelles

Jun-Hyuk Anh, Gyeong-Won Jeong,
and Jae-Woon Nah*

Macromol. Res., **26**, 650 (2018)

To induce a quick-drug release, lipoic acid (LA) was introduced to amine group of low molecular weight water-soluble chitosan (LMWSC) by coupling agent. The disulfide bond (-S-S-) of lipoyl group from LMWSC-grafted lipoic acid (LL) can response to glutathione (GSH) at cytoplasm with reducing environment, where LL can rapidly be disassembled via dissociation of disulfide bond (-S-S-) by GSH. Therefore, drug delivery system using LL may lead to high anticancer efficacy.

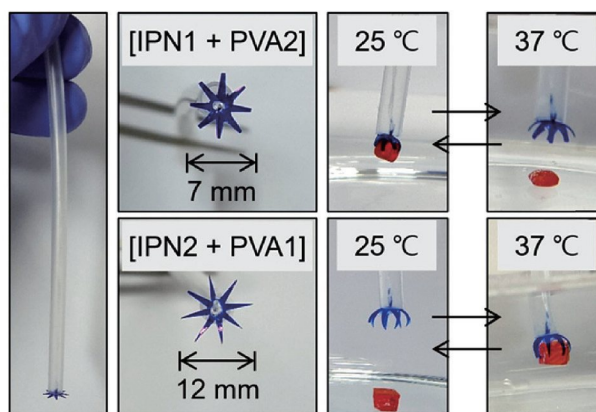


Temperature-Responsive Actuators Fabricated with PVA/PNIPAAm Interpenetrating Polymer Network Bilayers

Tae Hoon Lee and Jae Young Jho*

Macromol. Res., **26**, 659 (2018)

Temperature-sensitive hydrogel grippers were fabricated in the form of a bilayer by attaching an interpenetrating polymer network layer of poly(*N*-isopropylacrylamide) and poly(vinyl alcohol) (PVA) to a PVA hydrogel layer. The bending diameter and direction could be controlled by swelling ratio of each layer. In the gripping test, starfish-shaped bilayers could lift and release in response to temperature change.

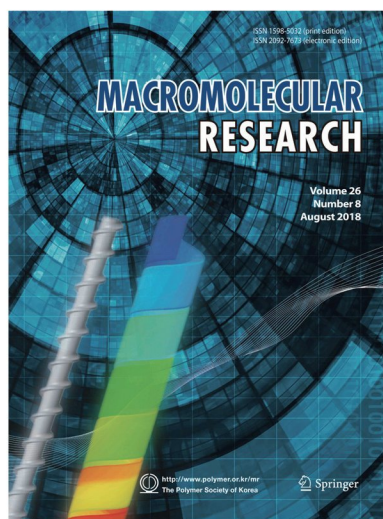


COVER PAPER

Simulation of Non-Isothermal Non-Newtonian Flow Behavior of PP for Various Injection Molding Screws and Comparison with Experimental Results

Seong-Yeol Park and Min-Young Lyu*

Vol. 26, No. 8, pp 744-754 (2018) | AUG 25, 2018 | DOI 10.1007/s13233-018-6093-1



Melting performance of an injection molding machine depends on the screw design. Barrier flight designs are common in the screw design. Flow behaviors and temperature distributions of PP according to the screw design were examined through full three-dimensional simulation and compared with melting experiment. Temperature distributions of PP in the screw exert a strong influence on the melting performance. Computer simulation verified the open-type of the barrier screw exhibited better melting than the standard screw and the closed-type barrier screw.

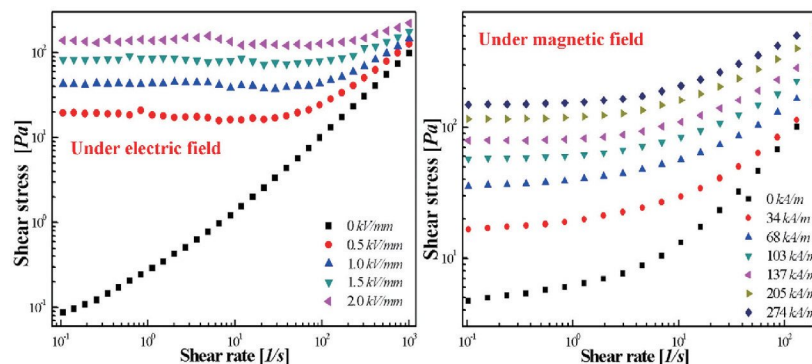
COMMUNICATION

Synthesis of Smart Poly(diphenylamine)/Magnetic Particle Composites and Their Electric/Magnetic Stimuli-Response

Yu Zhen Dong and Hyoung Jin Choi*

Macromol. Res., 26, 667 (2018)

Suspension consisting of synthetic poly(diphenylamine) (PDPA)/Fe₃O₄ composite particles dispersed in silicone oil exhibits significant changes in rheological properties under the stimulation of both electric and magnetic fields.



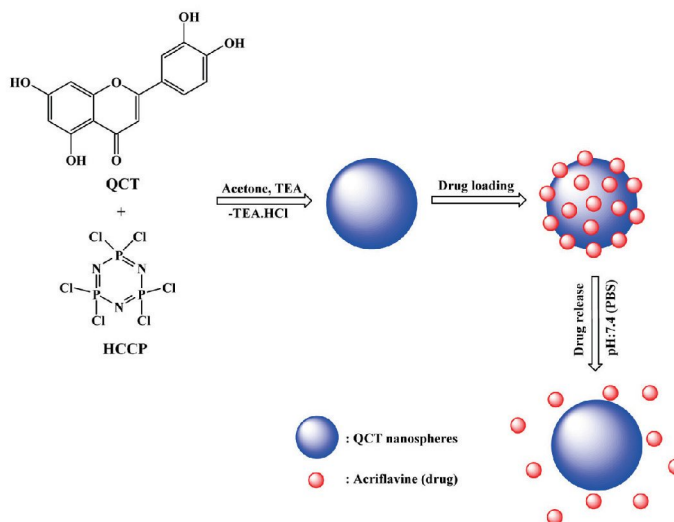
ARTICLES

Crosslinked Polyphosphazene Nanospheres with Anticancer Quercetin: Synthesis, Spectroscopic, Thermal Properties, and Controlled Drug Release

Simge Metinoğlu Örüml
and Yasemin Süzen Demircioğlu*

Macromol. Res., **26**, 671 (2018)

The original inorganic-organic hybrid cyclomatrix type polyphosphazene nanospheres were synthesized *via* self-assembly approach using hexachlorocyclotriphosphazene (HCCP) and quercetin (QCT). Quercetin was compared with 4',7-dihydroxyflavone as a monomer. Thermal and spectroscopic properties of nanospheres were investigated. Controlled drug release of the quercetin based nanospheres was investigated using acriflavine as a model drug.

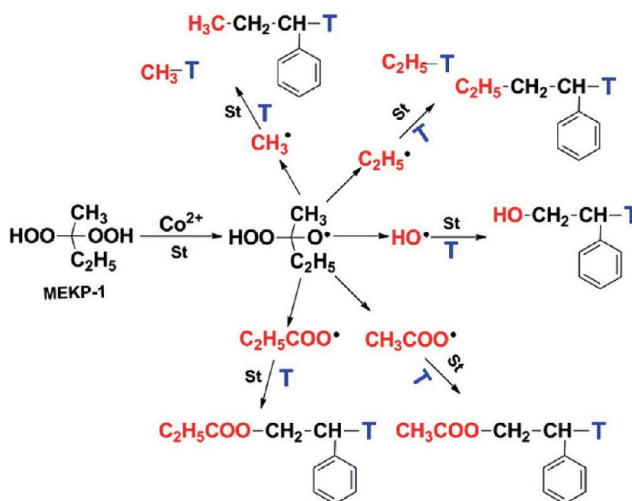


Initiation Mechanisms of Styrene with Methyl Ethyl Ketone Peroxide-Cobalt System

Ruiwei Guo, Yaqi Wang, Yongtao Qi,
Auke G Talma, and Jianhua Zhang*

Macromol. Res., **26**, 680 (2018)

The radical initiation mechanisms of monomeric MEKP (methyl ethyl ketone peroxide) catalyzed by cobalt isooctoate in the presence of styrene (St) were investigated by a combination of nitroxide radical trapping technique and HPLC-ESI/MS (high performance liquid chromatography-electrospray ionization/mass spectrometry). The results indicated that methyl, ethyl and hydroxyl radicals were the dominant intermediate radicals formed in the initiation process of MEKP-cobalt system, which would serve as the primary source to initiate styrene polymerization.

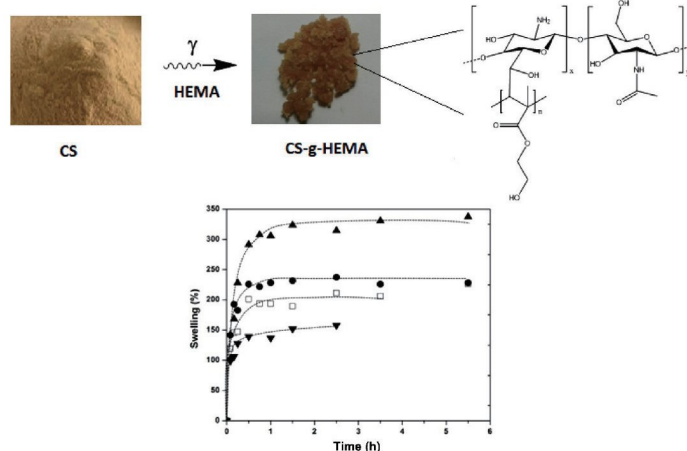


Graft Copolymerization of 2-Hydroxyethyl Methacrylate onto Chitosan Using Radiation Technique for Release of Diclofenac

Luisa Islas, Guillermina Burillo, and Alejandra Ortega*

Macromol. Res., **26**, 690 (2018)

The grafting percentage of 2-hydroxyethyl methacrylate (HEMA) onto chitosan (CS) was easily obtained and controlled using two radiation methods. The results showed that HEMA chains improved the water absorption ability of CS but only when the grafting percentage was low (< 30%). CS-g-HEMA has pH-responsiveness (3.75) while its capacity to load diclofenac was increased in comparison to CS.

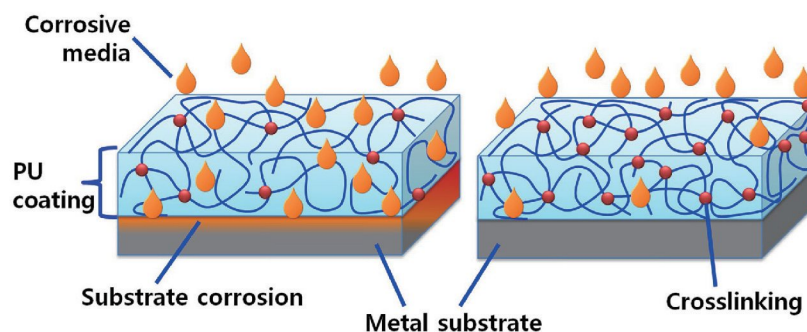


Controlled Hydroxyl Functionality of Soybean Oil-Based Polyols for Polyurethane Coatings with Improved Anticorrosion Properties

Prakash Alagi, Ravindra Ghorpade, Jeong Hyeon Jang, Chandrashekhar Patil, Harishchandra Jirimali, Vikas Gite, and Sung Chul Hong*

Macromol. Res., **26**, 696 (2018)

Corrosive medium penetrates into the loosely cross-linked polyurethane (PU) and attacks the substrate (left). Corrosive medium cannot penetrate into the densely cross-linked PU network on protected metal substrate (right).

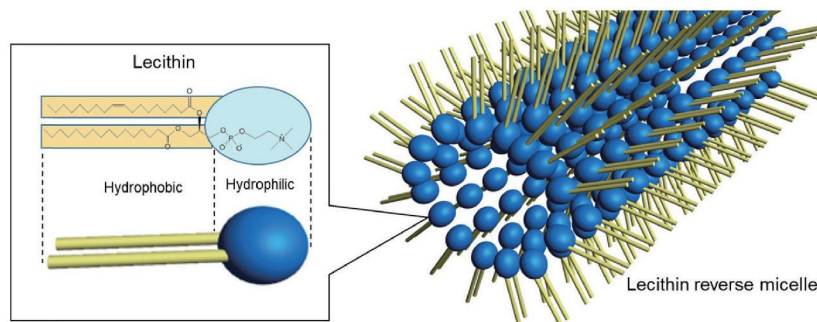


A New Form of Polyaniline: Polyaniline Whiskers Prepared in a Bio-surfactant Reaction Field

Kohei Yamabe and Hiromasa Goto*

Macromol. Res., **26**, 704 (2018)

Polyaniline (PANI) is synthesized in the presence of lecithin. Lecithin as a reaction field improves effective conjugation length for the PANI component followed by formation of composite having cylinder-like structure due to transition of expanded coil from compact coil, resulting increase of electrical conductivity. Lecithin plays roles of reaction field and a complementary partner material for construction of the biomaterial/synthetic-conducting polymer composite.

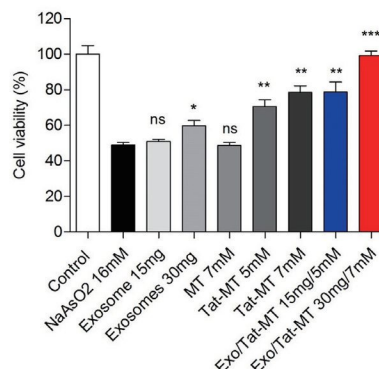


Regeneration of Anti-Hypoxic Myocardial Cells by Transduction of Mesenchymal Stem Cell-Derived Exosomes Containing Tat-Metallothionein Fusion Proteins

Qurrat Ul Ain, Young Sun Woo,
Jee Young Chung,
and Yong-Hee Kim*

Macromol. Res., **26**, 709 (2018)

The cytoprotective effects of exosomes transfected with Tat-metallothionein (Exo/Tat-MT) on cardiomyocytes were evaluated by accessing cell viability. Exo/Tat-MT significantly upregulated cell viability and downregulated apoptosis in cardiomyocytes. The therapeutic potential of exosome-mediated therapeutic protein delivery was demonstrated by strong cell viability (70-80%) under *in vitro* hypoxic conditions.

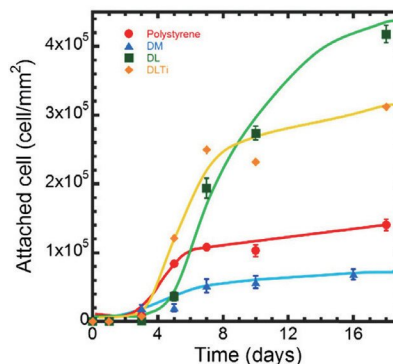


Nanocomposite Hydrogel Adhered to Concrete Material for Aquaculture of Marine Organism

Nam-Il Won, Sang-Hyeon Bok,
Jin-Sook Park*, and Yang Ho Na*

Macromol. Res., **26**, 717 (2018)

Nanocomposite (NC) hydrogels based on *N,N'*-dimethyl acrylamide using Laponite were prepared. The elongation and the fracture strength of NC hydrogel were greatly increased in comparison with those of typical hydrogels. In case of NC hydrogels, they had excellent adhesion properties to the concrete material and the adhesion of marine diatoms to the surface greatly increased. NC hydrogels are a good candidate for enhancing the culture of marine microalgae.

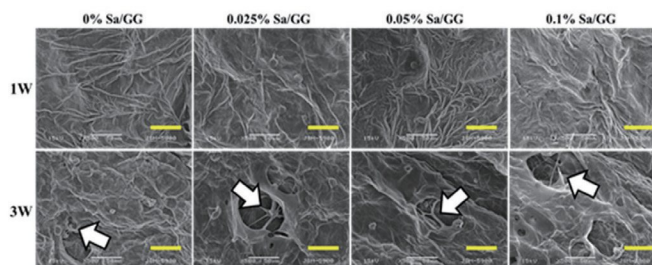


Evaluation of Saponin Loaded Gellan Gum Hydrogel Scaffold for Cartilage Regeneration

Ha Yan Jeon, Eun Yeong Shin,
Joo Hee Choi, Jeong Eun Song,
Rui L. Reis, and Gilson Khang*

Macromol. Res., **26**, 724 (2018)

Several concentrations of saponin (Sa), which is water-soluble, were fabricated well with gellan gum (GG) solution. Sa, found in many plants like clematis and ginseng, has long been used in traditional Chinese medicine to treat joint diseases including osteoarthritis. Also it has its ability of anti-inflammatory, antioxidant and anti-cancer. GG hydrogel is suitable as a cell encapsulating agent in the field of cartilage regeneration because of its easy processing and biocompatibility. In this study, GG hydrogel scaffolds with different concentration of Sa were conducted for analysis by SEM, FT-IR, compressive strength, water uptake, degradation rate, MTT assay, mRNA expression. It was observed that 0.025 wt% Sa/GG hydrogel scaffold shows good morphology, cell proliferation and mRNA expression results. The composite material supports cell growth covered with extracellular matrix (ECM) with maintaining its function. As a result, incorporation of Sa loaded with GG hydrogel scaffolds had positive result up to 0.025% in cartilage regeneration.

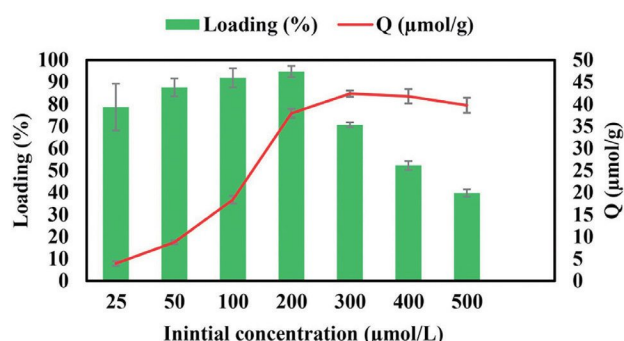


Sensitive Detection of Morphine by Efficient Molecular Imprinted Polymers Based on Goethite Nanorods

S. Mojtaba Amininasab*,
Parvin Holakoei, Zahed Shami,
and Marjan Hassanzadeh

Macromol. Res., **26**, 730 (2018)

A novel molecular imprinted polymer by using core-shell technology for selective recognition and removal of morphine was synthesized. Goethite nanorods was used as a core in the molecular imprinted polymer structure. The adsorption study results showed very fast detection, adsorption and removal process of morphine by molecular imprinted polymer in 45 min.

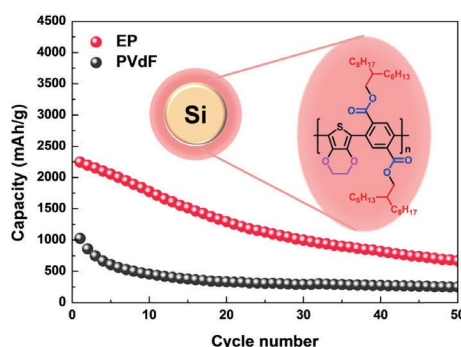


Enhancing the Performance of a Silicon Anode by Using a New Conjugated Polymer Binder Prepared by Direct Arylation

Hodong Chu, Kukjoo Lee,
Sanghyun Lim, and Tae-Hyun Kim*

Macromol. Res., **26**, 738 (2018)

A novel conjugated polymeric binder based on EDOT and phenylene (EP) was prepared. Unlike typical conjugated polymer synthesis, our EP was prepared without the use of organometallic intermediates by direct arylation. The developed electrically conductive EP binder showed an enhanced adhesion to Si, and the electrode made of EP showed a capacity of 2250 mAh g⁻¹ at its 1st cycle and 670 mAh g⁻¹ at the 50th cycle, much higher than those of the electrode made of a PVdF binder.

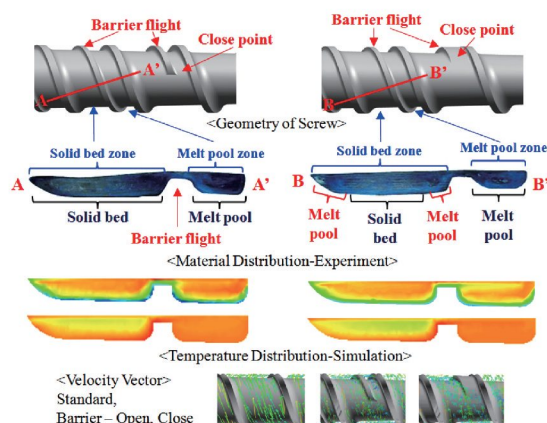


Simulation of Non-Isothermal Non-Newtonian Flow Behavior of PP for Various Injection Molding Screws and Comparison with Experimental Results

Seong-Yeol Park
and Min-Young Lyu*

Macromol. Res., **26**, 744 (2018)

Flow behavior of polypropylene in the injection molding screws were simulated and compared with those obtained by melting experiment. Simulation involved non-isothermal, non-Newtonian flow model and wound by screw channel model for full 3D geometry. The standard screw and two types of barrier screws were used. In the open-type of the barrier screw, the solid bed and melt pool were well separated by the barrier flight, allowing for better melting than in the standard screw and the closed-type of the barrier screw. This was verified by computer simulation.

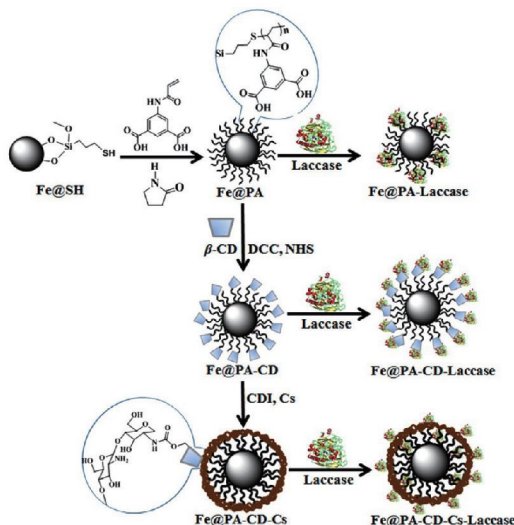


Laccase Immobilization onto Magnetic β -Cyclodextrin-Modified Chitosan: Improved Enzyme Stability and Efficient Performance for Phenolic Compounds Elimination

Roghayeh Tarasi, Masoumeh Alipour,
Lena Gorgannezhad,
Somaye Imanparast,
Aliakbar Yousefi-Ahmadipour,
Ali Ramezani,
Mohammad Reza Ganjali,
Abbas Shafiee,
Mohammad Ali Faramarzi*,
and Mehdi Khoobi*

Macromol. Res., 26, 755 (2018)

Cyclodextrin-chitosan conjugate covalently coated on the surface of magnetic nanoparticles was employed for laccase immobilization. The immobilized enzyme exhibited higher activity, stability, and reusability at a wide range of thermal and pH values than the free enzyme as well as acceptable efficiency for bio-removal of phenolic compounds.



A Novel Framework of Ternary $\text{Fe}_3\text{O}_4@\gamma\text{-APTES}@r\text{GO}$ Nanohybrid by $[\text{CH}_3\text{OH}]$ -Soluble Distribution for Synergistic Removal of 1,2,3-Benzotriazole

Tran Dinh Minh, Byeong-Kyu Lee*,
and Nguyen Le Minh Tri

Macromol. Res., 26, 763 (2018)

A novel nanohybrid $[\text{CH}_3\text{OH}]\text{-F}@\gamma\text{-A}@r\text{G}$ was employed to remove emerging contaminant 1,2,3-benzotriazole (BTA). Fe_3O_4 was core-shell coated with 3-aminopropyltriethoxysilane ($\gamma\text{-APTES}$) via *in-situ* aminosilanization, and then magnetic-polymer $\text{Fe}_3\text{O}_4@\gamma\text{-APTES}$ was deposited on the hexagonal arrays of reduced graphene oxide (rG) under $[\text{CH}_3\text{OH}]$ -soluble dispersion. We reported the feasibility of $[\text{CH}_3\text{OH}]\text{-F}@\gamma\text{-A}@r\text{G}$ as an easy-to-cover adsorbent for facile adsorption of BTA in the view of removal efficiency. Most of BTA were removed within 10 min as compared with the other popular adsorbents such as zeolite and modified activated carbon. We found that BTA was strongly chemisorbed at high temperature and be controlled by an endothermic reaction. All adsorption data were satisfactorily matched with Langmuir isotherm and pseudo-second order kinetics.

