「Macromolecular Research」목차

정기간행영문지_ 30권 5호 · 2022년 5월

COVER PAPER

Spermine Modified PNIPAAm Nano-Hydrogel Serving as Thermo-Responsive System for Delivery of Cisplatin

Soheila Ghasemi*, Marzieh Owrang, Farzad Javaheri, and Fatemeh Farjadian*

Vol. 30, No. 5, pp 314-324 (2022) | MAY 25, 2022 | DOI 10.1007/s13233-022-0035-7

Herein, thermo- and pH responsive nanohydrogel made of spermine modified poly(N-isopropylacrylamide) was prepared and applied for delivery of anticancer agent, cisplatin. The backbone synthesis was conducted through reversible addition fragmentation chain transfer polymerization technique. The system showed to be smart and potent anticancer agent.

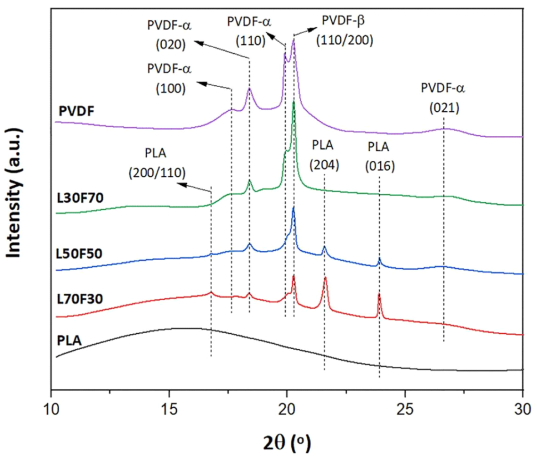
ARTICLES

Assessment of Surface, Structural, and Viscoelastic Properties of Immiscible Polylactic Acid/Polyvinylidene Fluoride Blends

Ali Hadian Rasanani,
Babak Kaffashi*,
Shervin Ahmadi, and Javad Seyfi

Macromol. Res., **30**, 285 (2022)

Morphology results from X-ray diffraction demonstrated that, in contrast to polyvinylidene fluoride (PVDF), polylactic acid (PLA) exhibits a more uniform distribution once utilized as the dispersed phase. The ratio of β to α crystals in PVDF was increased upon the introduction of PLA. On the other hand, the crystallized PVDF domains improved the PLA crystallinity.

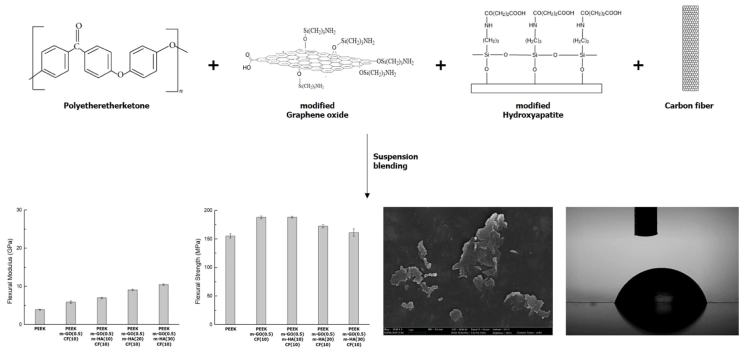


Flexural Properties of Polyetheretherketone Composites Containing Hydroxyapatite, Graphene Oxide, and Carbon Fiber for Spinal Implant Materials

Sangwoon Lee, In Sung Jeon, and Jae Young Jho*

Macromol. Res., **30**, 295 (2022)

Polyetheretherketone composites with modified graphene oxide, modified hydroxyapatite, and carbon fiber were developed to improve bioactivity and flexural properties of the polymer. The nano-sized fillers were modified with a silane coupling agent. By adding 0.5 wt% of modified graphene oxide, 30 wt% of modified hydroxyapatite, and 10 wt% of carbon fiber to the polymer, we earned the composite with flexural properties comparable to human cortical bone, improved bioactivity, and hydrophilicity.

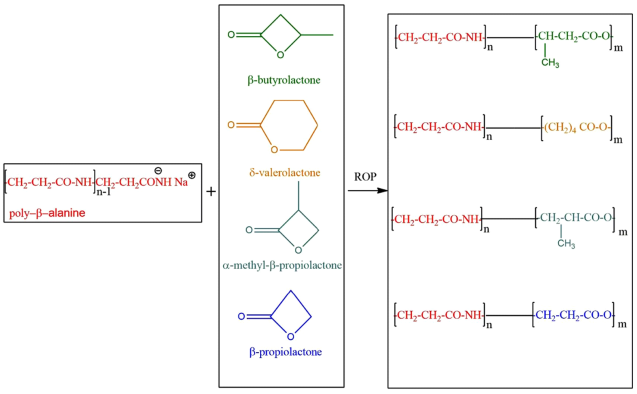


A Novel Strategy for Poly(*β*-alanine-*b*-lactone)s: Sequentially HTP and AROP

Efkan Çatıker* and Ayçanur Hamzaçebi

Macromol. Res., **30**, 305 (2022)

Acrylamide and four lactones (*β*-butyrolactone, *δ*-valerolactone, *α*-methyl propiolactone, and *β*-propiolactone) as comonomers were used to synthesize poly(*β*-alanine-b-lactone)s through sequentially hydrogen-transfer polymerization (HTP) and anionic ring-opening polymerization (AROP). The formation of ester blocks from the active chain-ends was achieved by the addition of the predetermined amounts of each lactone into the reaction vessel.



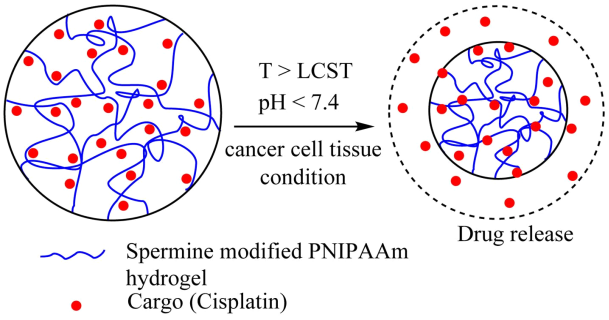
Spermine Modified PNIPAAm Nano-Hydrogel Serving as Thermo-Responsive System for Delivery of Cisplatin

Soheila Ghasemi*, Marzieh Owrang, Farzad Javaheri, and Fatemeh Farjadian*

Macromol. Res., **30**, 314 (2022)

Cover Paper

Firstly, temperature-responsive poly(*N*-isopropylacrylamide) was prepared using reversible addition fragmentation chain transfer (FART) polymerization. Then the hydrogel was amino modified and the cisplatin was conjugated to it. Cisplatin is liberated from the carrier in the acidic environment and around the transition temperature of the polymer. The *in vitro* toxicity assessment was conducted on MCF-7 cell line.

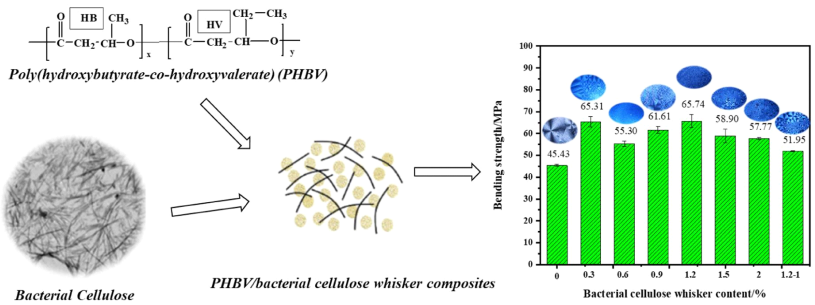


Effects of Bacterial Cellulose Whisker Melting Composite on Crystallization and Mechanical Properties of PHBV Composites

Zhou Xin Ting* and Liu Jin Yan*

Macromol. Res., **30**, 325 (2022)

Acetylation of bacterial cellulose whisker (BCW) with acetic anhydride can effectively improve the thermal stability of BCW and the dispersion of interface compatibility with poly(3-hydroxybutyrate-*co*-3-hydroxyvalerate) (PHBV). The influence of the modified cellulose whiskers on the crystallization and mechanical properties of the PHBV matrix was studied using differential scanning calorimetry (DSC), polarization optical microscopy (POM), and X-ray diffraction (XRD). The results show that acetylated bacterial cellulose whisker (ABCW) has heterogeneous nucleation and hindrance effect on the PHBV matrix simultaneously. With the increase of ABCW content, PHBV gradually decreases from large spherulite and then increases, and the crystallinity decreases. When the content of ABCs is 1.2%, ABCW has the best strengthening effect on PHBV, and the bending strength and bending modulus are 44.7% and 34.5% higher than PHBV.

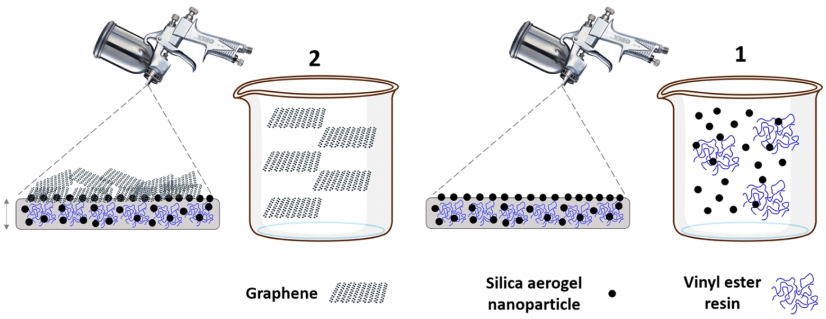


Investigating the Effects of Graphene Content and Application Method on Surface Properties of Vinyl Ester/Silica Aerogel Coatings

Kiyoumars Labani Motlagh, Javad Seyfi*, Hossein Ali Khonakdar, and Saeed Mortazavi

Macromol. Res., **30**, 334 (2022)

A pre-optimized amount of silica aerogel nanoparticles was first incorporated into vinyl ester (VE) resin, and then spray-coated on aluminum sheets. Different graphene contents (1, 2, and 3% w/w) were applied *via* one-step and two-step spraying methods. The maximum protection efficiency was obtained for the two-step coating loaded by 2% graphene (η = 99.5%).

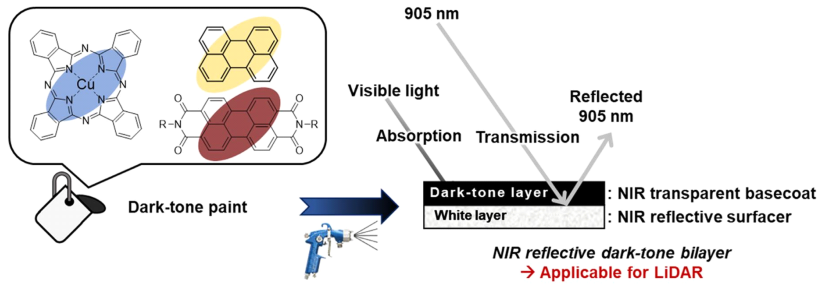


Near-Infrared Reflective Dark-Tone Bilayer System for LiDAR-Based Autonomous Vehicles

Taeho Lim, Seong Hee Bae, Sung Ho Yu, Kyung-Youl Baek, and Sangho Cho*

Macromol. Res., **30**, 342 (2022)

In this study, we developed a NIR transparent dark-tone basecoat using a combination of organic pigments. And this layer is combined with NIR-reflective surfacer. Throw this combination, we prepared NIR reflective dark-tone bilayer. By controlling the ratio of organic pigments, we could tune the dark tone with low L* values (23.91-28.88). And they showed a high NIR reflectance (51-69%).



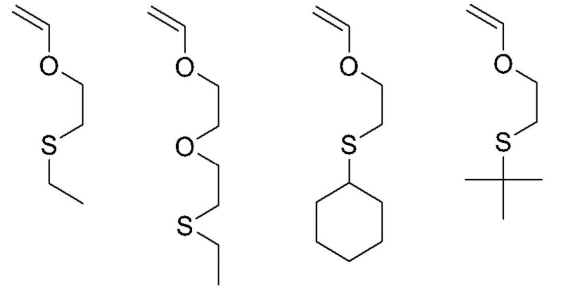
NOTE

Controlled Cationic Polymerization of Alkyl-Sulfide-Containing Vinyl Ethers

Kazuma Ishikawa,
Takeshi Namikoshi*,
Yuhei Watanabe, Atsushi Arisawa,
and Shinji Watanabe

Macromol. Res., **30**, 348 (2022)

Cationic polymerization of 2-(2-ethylthioethoxy)ethyl vinyl ether, an alkyl sulfide vinyl ether whose sulfur atom is located far from the vinyl group, produced a high-molecular-weight polymer with a narrow molecular weight distribution. 2-(Cyclohexylthio)ethyl vinyl ether and 2-(tert-butyl-thio)ethyl vinyl ether—vinyl ethers with sulfides substituted by bulky alkyl groups—inhibited intramolecular cyclization and yielded high-molecular-weight polymers with narrow molecular weight distributions, even when sulfur was located close to the vinyl group.



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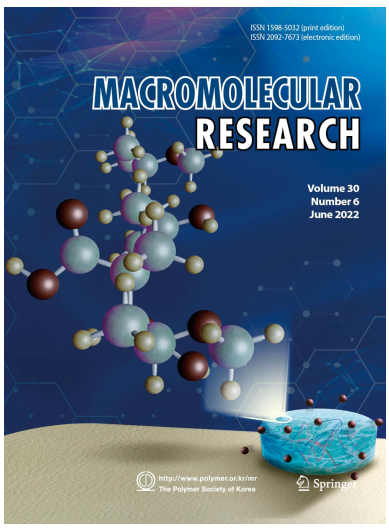
정기간행영문지_ 30권 6호 · 2022년 6월

COVER PAPER

A pH/Temperature-Sensitive s-IPN Based on Poly(vinyl alcohol), Poly(vinyl methyl ether-*alt*-maleic acid) and Poly(vinyl methyl ether) Prepared by Autoclaving

Karla F. García-Verdugo, Andya J. Ramírez-Irigoyen, Mónica Castillo-Ortega, Dora E. Rodríguez-Félix, Jesús M. Quiroz-Castillo, Judith Tánori-Córdova, Francisco Rodríguez-Félix, Antonio Ledezma-Pérez, and Teresa del Castillo-Castro*

Vol. 30, No. 6, pp 353-364 (2022) | JUN 25, 2022 | DOI 10.1007/s13233-022-0044-6



A novel semi-interpenetrating polymer network (s-IPN) based on the entrapment of a thermosensitive polymer, the poly(vinyl methyl ether) (PVME), within a crosslinked 3D structure of poly(vinyl alcohol) (PVA) and poly(vinyl methyl ether-alt-maleic acid) (COP) was synthesized by an autoclaving process. The s-IPN exhibited a promising performance for the controlled drug delivery in response to the pH and temperature conditions.

ARTICLES

A pH/Temperature-Sensitive s-IPN Based on Poly(vinyl alcohol), Poly(vinyl methyl ether-*alt*-maleic acid) and Poly(vinyl methyl ether) Prepared by Autoclaving

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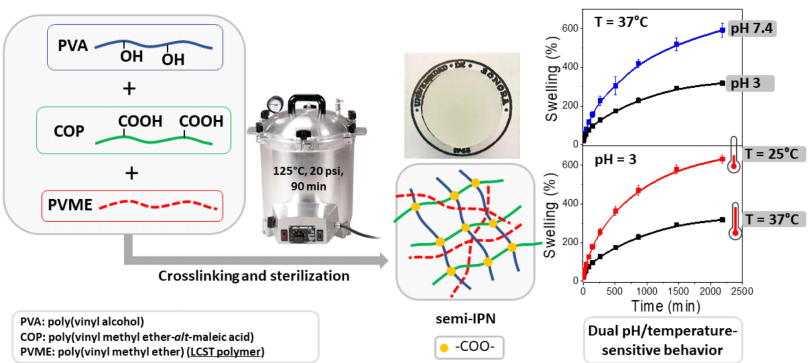
and Teresa del Castillo-Castro*

Macromol. Res., **30**, 353 (2022)

Cover Paper

A novel pH- and thermosensitive semi-interpenetrated network formed by the entrapment of the poly(vinyl methyl ether) during the crosslinking and sterilization of material.

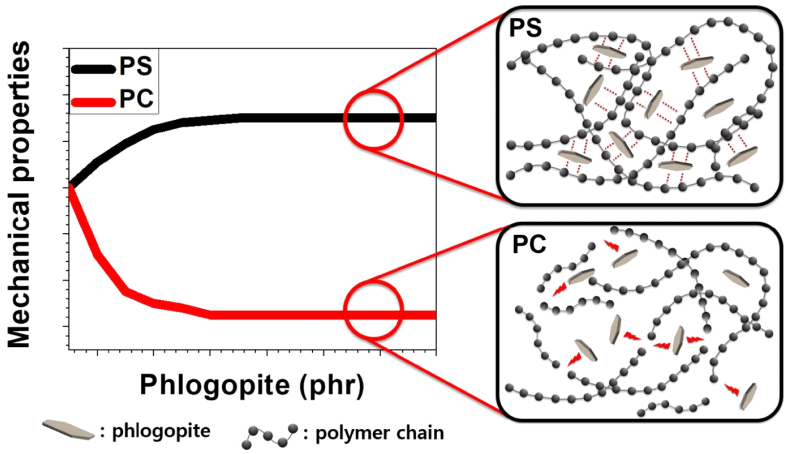


Mechanical, Thermal, and Rheological Properties of Phlogopite-Incorporated Polycarbonate and Polystyrene

Sang-Seok Yoon, Sung-Hun Lee, Gyu-Chul Hwang, Min-Kyu Choi, Beom-Goo Kang, Hyungsu Kim, and Keon-Soo Jang*

Macromol. Res., **30**, 365 (2022)

Polymer/phlogopite composites have been rarely investigated despite their potential applications. We examined the effects of phlogopite on the mechanical, thermal, and rheological properties of two amorphous polymers, namely, ductile polycarbonate (PC) and brittle polystyrene (PS). The mechanical and thermal properties of PS/phlogopite composites improved with increasing phlogopite content. The modulus of PC/phlogopite composites showed a greater increase as a function of phlogopite concentration probably due to the good interfacial attraction between the phlogopite and PC, compared with the other filler-embedded PC composites. The mechanical and thermal properties (except for the modulus of PC/phlogopite composites) decreased owing to the PC chain scission (reduction in molecular weight) during extrusion, which was caused by the phlogopite infiltration into the PC matrix. The phlogopite's effects on the abovementioned polymers were compared with those on other fillers such as kaolin and silica.

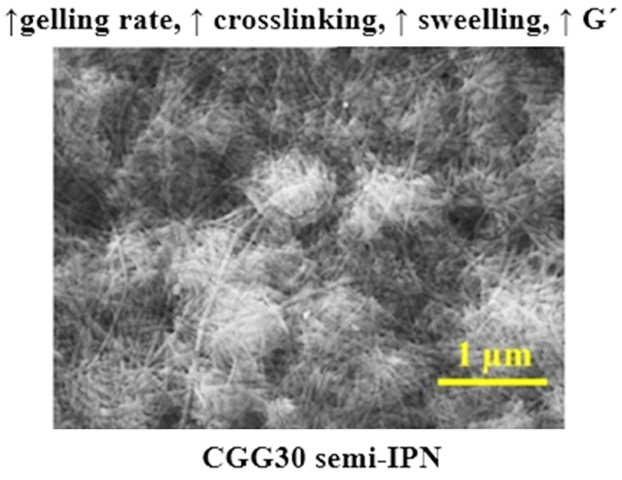


Hydrogels for Biomedicine Based on Semi-Interpenetrating Polymeric Networks of Collagen/Guar Gum: Synthesis and Physicochemical Characterization

Edith E. Lopéz-Martínez, Jesús A. Claudio-Rizo*, Martín Caldera-Villalobos, Juan J. Becerra-Rodríguez, Denis A. Cabrera-Munguía, Lucía F. Cano-Salazar, and Rebeca Betancourt-Galindo

Macromol. Res., **30**, 375 (2022)

The semi-interpenetration of guar gum in a collagen matrix allows the generation of hydrogels with both tailored structure and properties that could be used to produce dressings for wound healing. A concentration of 30 wt% of this polysaccharide (CGG30) improves the gelling rate, crosslinking, water absorption capacity and storage modulus of the semi-interpenetrating polymeric networks (semi-IPN) hydrogel, with respect to the collagen matrix.

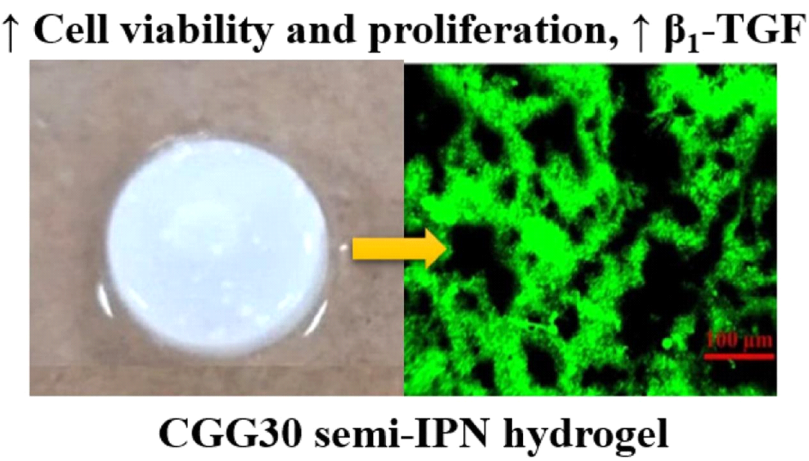


Hydrogels for Biomedicine Based on Semi-Interpenetrating Polymeric Networks of Collagen/Guar Gum: Applications in Biomedical Field and Biocompatibility

Edith E. Lopéz-Martínez, Jesús A. Claudio-Rizo*, Martín Caldera-Villalobos, Juan J. Becerra-Rodríguez, Denis A. Cabrera-Munguía, Lucía F. Cano-Salazar, and Rebeca Betancourt-Galindo

Macromol. Res., **30**, 384 (2022)

The chemical composition of the collagen/guar gum semi-interpenetrating polymeric networks (semi-IPN) matrices shows to allow the viability of monocytes and fibroblasts without cytotoxic effects, promoting cell proliferation; furthermore, CGG30 demonstrates modulating monocyte metabolism to stimulate β_1-TGF secretion. These biological response and biocompatibility results demonstrate that these new matrices could be successfully used in regenerative medicine strategies such as dressings for wound healing.

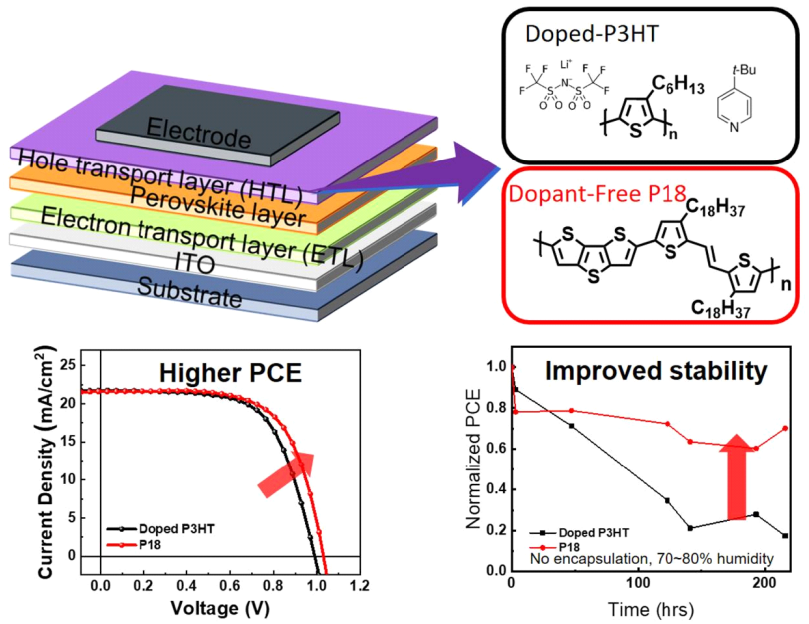


A Thiophene Based Dopant-Free Hole-Transport Polymer for Efficient and Stable Perovskite Solar Cells

In-Bok Kim, Yeon-Ju Kim, Dong-Yu Kim, and Soo-Young Jang*

Macromol. Res., **30**, 391 (2022)

A dopant-free D-D type conjugated polymer, P18, which is consisted of rigid and coplanar thienylenevinylene and dithienothiophene, is used as a HTL in perovskite solar cells (PSCs). A power conversion efficiency of the PSCs with dopant-free P18 as the HTL was 14.8%, which is higher than the values performed for the devices using the doped P3HT as an HTL (13.9%). Furthermore, the PSC fabricated with the dopant-free P18 can preserve a performance of 60% under the humidity conditions of 70-80% after 200 hours without encapsulation, which is superior to those fabricated with doped P3HT (25%).

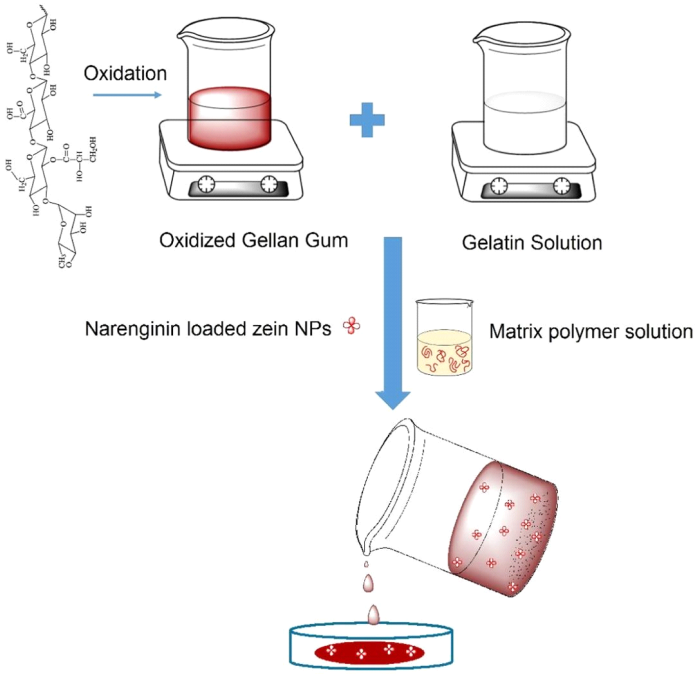


Development of Gelatin Thin Film Reinforced by Modified Gellan Gum and Naringenin-Loaded Zein Nanoparticle as a Wound Dressing

Marjan Ghorbani*, Nasrin Hassani, and Mortaza Raeisi

Macromol. Res., **30**, 397 (2022)

Newly, the importance of using biocompatible nanocomposite film with appropriate characteristics has attracted interest for potential applications in the wound healing. In this research, Gelatin/aldehyde-modified Gellan/Naringenin-loaded Zein nanocomposite films were successfully produced.

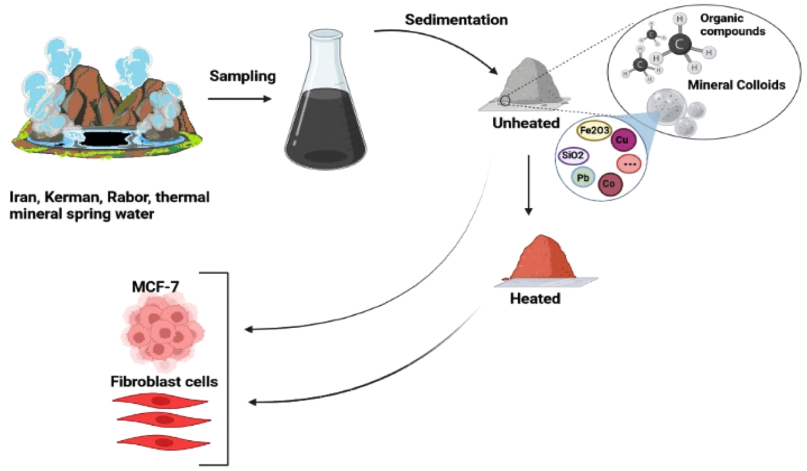


Anti-Cancer Evaluation of Mineral Colloids Against MCF-7 Cell Lines: An Investigation Through Thermal Spring Water

Mehdi Firouzi, Maryam Ehteshamzadeh, Fakhredin Saba*, Gholam Reza Khayati, and Zhaleh Fakhri

Macromol. Res., **30**, 406 (2022)

In the present study, we characterized colloidal minerals obtained from hot springs. Also, dimensions of their constituent particles are less than 50 nm, and include SiO_2, Al_2O_3, Fe_2O_3, CaO, Sr, V, Zr, Cr, Cu, Zn, and *et al.* Then, we investigated their anti-cancer properties in two samples, with and without heat treatment. Meanwhile, we examined the contribution of organic compounds and other impurities. Results of the present study also show that mineral colloids had growth inhibitory effect on cancer cells; in addition, no destructive effect was observed on human fibroblast cells. Also, the mineral effect of heated and non-heated colloids was almost similar, which shows a slight effect of impurities and organic compounds. According to the results, most of the properties could be attributed to chemical elements and compounds.



Isothermal Crystallization Kinetics of Polyamide 6 with Chain Extender

Tao Zhang, Seung-Jun Lee,
Kyu-Hwan Park,
and Ho-Jong Kang*

Macromol. Res., **30**, 415 (2022)

Addition of chain extender and polyketone (PK) to nylon 6 (PA6) results in a decrease in the degree of crystallization and the crystallization rate due to the formation of branches and the additional formation of hydrogen bonds between branched PA6 and PK chains. The increase in the chain extender content or reaction temperature speeds up the reaction forming branches to result in a greater decrease in the degree of crystallization and the crystallization rate.