

Kwan Han Yoon, Sang Cheol Lee, and O Ok Park
Compatibility of Poly(ethylene 2,6-naphthalate) and
Poly(butylene terephthalate) Blends
Korea Polymer Journal, 2(2), 75(1994)

Blends of poly(ethylene 2,6-naphthalate)(PEN) and poly(butylene terephthalate)(PBT) were prepared by both solution and melt methods. Any significant difference was not observed for the glass transition and melting temperatures. These blends showed a partial compatibility based on the glass transition temperatures. PEN and PBT crystallized separately to exhibit two melting temperatures. The crystallization rate of PEN in PEN-rich blends was not affected by the PBT content, while that of PBT in PBT-rich blends decreased with an increase of the PEN content. By comparing the experimental modulus and strength with those predicted from Kleiner's and Paul's model, PEN/PBT blends can be described to have some compatibility throughout the compositions.

E-Joon Choi and Jin Chul Jung
A Study on the Cyclodehydration Reaction Converting
Poly(amidoxime)s to Poly(1,2,4-oxadiazole)s
Korea Polymer Journal, 2(2), 80(1994)

A study was made on the thermal cyclodehydration reaction converting poly(amidoxime)s(PAOs) into the corresponding poly(1,2,4-oxadiazole)s(PODs). The PAOs were prepared by condensation of terephthaloyl chloride with isophthalamidoxime(ID), 2,5-dimethylterephthalamidoxime(DTD) and terephthalamidoxime(TD). The cyclodehydration reaction was found to be an exothermic reaction taking place in a broad range of temperatures between 120 and 320°C. ID-PAO revealed the highest rate of reaction and DTD-PAO showed that the polymers DTD-POD may not be cyclodehydrated at 300 °C due to thermal degradation, while ID-POD and TD-POD were stable enough at that temperature to be heated for cyclization.

Jae-Hee Jung and Yong Kiel Sung
Synthesis and Physical Properties of Stimuli-Sensitive
Copolymeric Hydrogels(I) : Hydrophilic-Hydrophobic
Poly(N-isopropyl acrylamide) Copolymer Systems
Korea Polymer Journal, 2(2), 85(1994)

The swelling behaviors of copolymeric hydrogels containing thermosensitive poly(N-isopropyl acrylamide) [poly(NIPAAm)] in water have been investigated. Poly(N-isopropyl acrylamide-co-alkyl methacrylate)[poly

(NIPAAm-co-AMA)], poly(N-isopropyl acrylamide-co-hydroxyethyl methacrylate)[poly(NIPAAm-co-HEMA)], and poly(N-isopropyl acrylamide-co-N-vinyl pyrrolidone) [poly(NIPAAm-co-NVP)] hydrogels were prepared by the solution polymerization of NIPAAm and its comonomers with AIBN at 80°C for 40 hr. The equilibrium swelling ratios of these hydrogels were dependent upon the temperature and the comonomer such as AMA, HEMA, and NVP. The swelling ratios were decreased with an increase in the hydrophobic AMA comonomer content in the hydrogels. The lower critical solution temperatures(LCSTs) of the resulting hydrogels were decreased by the introduction of hydrophobic comonomers, whereas the LCSTs were increased by the introduction of hydrophilic comonomers in the hydrogels. These temperature dependent phenomena were also confirmed by differential scanning calorimetry.

Chong-Su Cho, Jeong-Hun Ha, Sung-Ho Kim, Yong-Jae Jung, Byung-Wook Jo, and Joong-Kuen Kwon
Bioerodible Hydrogel Based on Interpenetrating Poly-
mer Networks Composed of Poly(D,L-lactic acid) and
Poly(ethylene glycol) Macromer
Korea Polymer Journal, 2(2), 91(1994)

Poly(ethylene glycol)(PEG) macromers terminated with acrylate groups and semi-interpenetrating polymer networks(IPNs) composed of poly(D,L-lactic acid)(PLA) and PEG macromer were synthesized and characterized with the aim of obtaining a bioerodible hydrogel that could be used to release drugs. Polymerization of PEG macromer resulted in the formation of cross-linked gels due to the multifunctionality of macromer. Glass transition temperature(T_g) and melting temperature(T_m) of PEG network and PLA in the IPNs were shifted, indicating an interpenetration of PLA and PEG chains. It was found that water content decreased with increasing PLA weight fraction due to the hydrophobicity of PLA. These IPNs gels degrade upon hydrolysis and their degradation rates can be controlled by cross-linking density and the nature of PEG and the mole fraction of PEG in the IPNs.

Seong Hun Kim and Samuel P. Sawan
Physical Properties of Liquid Crystal Polymer Fiber
and Polyimide Composite Materials
Korea Polymer Journal, 2(2), 96(1994)

The use of high strength aromatic copolyester thermotropic liquid crystal polymers in fibrous composite st-

ructures with polyimide adhesives as binding materials can eliminate directional mechanical property differences of liquid crystal polymers with controlling of each fibrous layer alignment in different directions, while retaining many of the original mechanical strengths. With this approach, a two-dimensionally isotropic liquid crystal polymer composite material can be obtained from the highly anisotropic liquid crystal polymer fiber. Kinetics of imidization of the polyamic acid (benzophenone tetracarboxylic dianhydride and 3,3'-methylene dianiline) for bonding LCP fibers have been evaluated at 225°C, 275°C and 325°C. Sound velocity measurement and tensile testing of composites show that higher polyimide content provides higher modulus materials. Morphology study of LCP fiber and polyimide composites using scanning electron micrograph reveals poor interfacial adhesion between them.

Yeong-Soon Gal, Bal Jung, Won-Chul Lee, and Sam-Kwon Choi

Polymerization of Propargylammonium Bromides by Transition Metal Catalysts

Korea Polymer Journal, 2(2), 104(1994)

Novel conjugated ionic polymers from propargylammonium bromides having different ammonium cations were synthesized and characterized. PdCl₂ and PtCl₂ were found to be very effective catalysts whereas most of the W- and Mo-based catalysts except MoCl₅-EtAlCl₂ failed to polymerize these ionic acetylene monomers. In the polymerization by PdCl₂, DMF, DMSO, pyridine, and formic acid were found to be good solvent. The resulting polymers were brown or black powder and mostly insoluble in any organic solvents regardless of the polymerization conditions and the catalysts used. The infrared spectra of conjugated ionic polymers showed neither the acetylenic $\equiv\text{C-H}$ stretching nor the acetylenic $\text{C}\equiv\text{C}$ stretching observed in the infrared spectra of monomers. Instead the conjugated double bond stretching of polymer backbone was newly observed at 1630~1652cm⁻¹. Thermal and morphological properties of these polymers were also studied.

Byung-Gu Kim, Myoung-Seon Gong, and Ji-Heung Kim

Synthesis and Properties of Poly(enthionitrile)s and Their Copolymers

Korea Polymer Journal, 2(2), 109(1994)

Poly(enthionitrile)s and their copolymers have been newly synthesized by reacting p-bis(1-chloro-2,2-dicyanovinyl)benzene(2) with sodium sulfide and bisphenol A by interfacial polymerization technique. The copolymers, which are soluble in organic solvents, possess

good thermal stability. These polymers undergo a curing reaction around at 350°C to give insoluble material and show 80% of residual weight at 500°C and 60% at 650°C.

Jyongsik Jang

Spectroscopic Studies of Epoxy Coated Steel(I)

Korea Polymer Journal, 2(2), 116(1994)

In order to protect the steel from corrosion under the hot/wet condition, epoxy resin and epoxy/DSO system were used as corrosion barrier. The corrosion behavior of steel surface has been examined by Fourier transform infrared Reflection-Absorption spectroscopy (FTIR-RAS). At 100% relative humidity condition, the oxidized steel is mainly composed of $\alpha\text{-FeOOH}$. In the case of epoxy coated steel, it is mostly composed of Fe₃O₄ after humidity test, and Epoxy/DSO system effectively suppresses the corrosion formation of steel surface compared to the epoxy resin. In addition, the thickness of epoxy coating on the steel surface was investigated from the point of corrosion behavior.

Jyongsik Jang

Spectroscopic Studies of Epoxy Coated Steel(II)

Korea Polymer Journal, 2(2), 121(1994)

Various silane coupling agents have been introduced to protect the surface from corrosion of epoxy/steel system. Under the hot/wet condition, amino silane occurs the degradation and forms the surface corrosion on the steel. In the case of $\gamma\text{-MPS}$ /steel system, the oxidation of steel surface was suppressed due to the improved adhesion of $\gamma\text{-MPS}$ in humid environment. In epoxy/silane/steel system, chemical bonding at the silane/steel may improve the corrosion protection on the steel surface. In addition, the role of zinc powder has been evaluated in the epoxy/steel system through the cathodic protection mechanism.

Chul Rim Choe and Jyongsik Jang

Surface Modification of HS/HM Polyethylene Fiber for Composite Applications(I)

Korea Polymer Journal, 2(2), 126(1994)

Cold plasma etching and chemical treatment have been used in order to create the polar functional groups on the high strength/high modulus (HS/HM) polyethylene fiber surfaces. As the treating time of plasma etching increased up to 15 min, the amount of oxygen on the PE fiber increased gradually due to the abstraction of hydrogen from the polymer backbone. Diffuse Reflectance Infrared Fourier Transform (DRIFT) spectroscopy has been used for the analysis of PE fiber surface. Compared to the plasma treatment only, plasma/silane treat-

ment of PE fibers enhanced the hydroxyl formation on the surface. Interlaminar shear strength(ILSS) of modified PE fiber composite was measured as functions of plasma treatment time and the silane solution concentration. ILSS of plasma/silane treated composites showed higher value than that of plasma treated PE composites due to the improved wettability and chemical bonding.

Moon Bae Ko, Sang Cheol Kim, and Won Ho Jo
Cure Behavior of Diglycidyl Ether of Bisphenol A/Diaminodiphenylmethane in the Presence of α , ω -Methyl Carboxylate-Butadiene-Acrylonitrile Copolymer
Korea Polymer Journal, 2(2), 131(1994)

The isothermal cure behavior of diglycidyl ether of bisphenol A(DGEBA)/diaminodiphenyl methane(DDM) in the presence of α , ω -methyl carboxylate-butadiene-acrylonitrile copolymer(est-CTBN) has been analyzed by differential scanning calorimetry and rheometry. The result shows that the cure mechanism changes from the autocatalytic cure mechanism to the n th order reaction as the concentration of est-CTBN increases. This change of mechanism seems to be caused by the decrease in the degree of participation of the hydroxyl group *in situ* formed as a result of the reaction between an epoxide group and a primary amine of DDM during the subsequent ring opening. The lower participation of the hydroxyl group in the ring opening may arise from the fact that the probability to form hydrogen bonds between the hydroxyl groups and carbonyl groups of est-CTBN becomes greater as the concentration of est-CTBN increases.

Jin-Hae Chang, Byung-Wook Jo, and Jung-Il Jin
***In situ* Composites of a New Thermotropic LCP and PBT**

Korea Polymer Journal, 2(2), 140(1994)

A new thermotropic liquid crystalline polymer(TLCP) containing a flexible spacer was synthesized from hydroquinone, p-hydroxybenzoic acid, and 1, 6-dibromohexane. Blends of TLCP with PBT were melt spun at different draw ratio to produce a monofilament. A maximum in the ultimate tensile strength was observed for blends containing 5% LCP regardless of draw ratio, and then it decreased with further increase in the LCP content. However, the initial modulus monotonously increased with increasing the LCP content. Thermal, morphological and mechanical properties of the blends were examined by different scanning calorimetry(DSC), polarized optical microscopy, scanning electron microscopy(SEM), and capillary rheometry.

Hyo Jin Kim, Bumsuk Jung, Jae-Min Hong, Yong Soo Kang, and Un Young Kim
Pervaporation of Water/Ethanol Mixture through Partially Imidized Polyimide Membranes of Pyromellitic Dianhydride and 4,4'-Oxydianiline
Korea Polymer Journal, 2(2), 148(1994)

The partially imidized polyimide membrane was prepared by varying imidization condition of the poly(amic acid) of pyromellitic dianhydride and 4,4'-oxydianiline. The carboxylic acid content of the membrane representing its hydrophilicity was controlled by the imidization condition. The effect of the carboxylic acid content on the pervaporation property of water/ethanol mixture was investigated. When the degree of imidization of the poly(amic acid) was 60%, both high flux and high separation factor were obtained. The result was interpreted in terms of the facilitated transport where the carboxylic acid was considered to act as a carrier for the facilitated water transport.

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