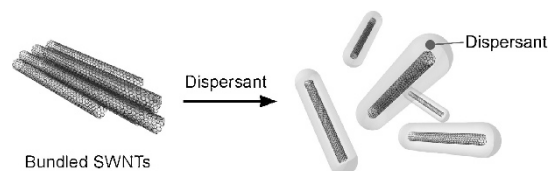


REVIEW ARTICLE

Methodology for Homogeneous Dispersion of Single-walled Carbon Nanotubes by Physical Modification

We review the recent progress as well as our approaches to the solubilization of single-walled carbon nanotubes (SWNTs) based on physical modification. Especially, we focus on the 'individual' solubilization of pristine SWNTs in solvents. The individual solubilization based on physical modification can maintain SWNTs intact and is an attractive route for taking advantage of their intrinsic properties. Individually solubilized SWNTs are useful nanomaterials for a wide range of science and technology.

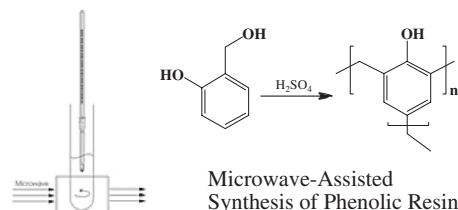


T. FUJIGAYA and N. NAKASHIMA
Vol. 40, No. 7, pp 577–589 (2008)

SHORT COMMUNICATION

Rapid Synthesis of Phenolic Resins by Microwave-Assisted Self-Condensation of Hydroxybenzyl Alcohol Derivatives

The microwave-assisted synthesis of phenolic resins by the polycondensation of hydroxybenzyl alcohol derivatives is described. The polymerization of 2-hydroxybenzyl alcohol in poly(ethylene glycol) using sulfuric acid as a catalyst under microwave irradiation (120 W) was completed within 5 min. The microwave irradiation enhanced the reaction rate of the polymerization and controlled the structures of the obtained novolacs; however, it did not influence the molecular weights, and the molecular weight distributions of the polymers.



A. KOBAYASHI and G. KONISHI
Vol. 40, No. 7, pp 590–591 (2008)

REGULAR ARTICLE

Preparation and Characterization of pH and Temperature Dual Responsive-, Poly(*N*-isopropylacrylamide-*co*-itaconic acid) Hydrogels Using DMF and Water as Mixed Solvents

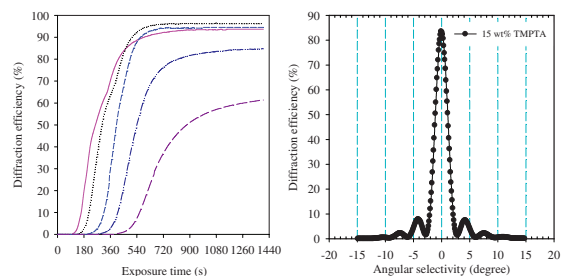
A series of Poly(*N*-isopropylacrylamide-*co*-itaconic acid) hydrogels were synthesized in the DMF and water mixed solvents. With the increase of the DMF content in the preparation, the degree of phase separation becomes pronounced. After purification, macroporous hydrogels were formed. The chemical compositions of these hydrogels were almost the same, while with different polymer chain conformations. Those hydrogels with extended polymer chains and expanded network structures had superior performances in equilibrium swelling ratios and deswelling/reswelling experiments.



Y. LING and M. LU
Vol. 40, No. 7, pp 592–600 (2008)

Improvement of the Performance of Transmission Holographic Grating by Hydrolysis-induced Change of the Property of Polymer Matrix

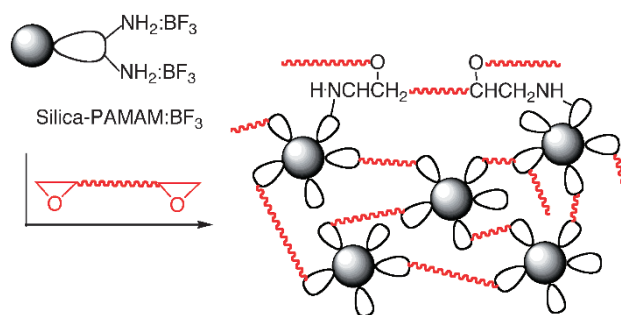
Methacrylate with silyl ether group was used as a reactive diluent together with multi-functional acrylate to fabricate transmission holographic polymer dispersed liquid crystal grating. Atmospheric moisture and cationic species generated from photo-initiator system could hydrolyze the silyl ether to afford hydrophilic hydroxyl groups to polymer matrix during grating formation. The change of the property of the matrix from hydrophobic to hydrophilic could efficiently induce phase separation of hydrophobic LC from the matrix. High diffraction efficiency and small angular selectivity were obtained even with low concentration of multi-functional acrylate.



X. WANG, Y. H. CHO, and Y. KAWAKAMI
Vol. 40, No. 7, pp 601–606 (2008)

Curing of Epoxy Resin by Hyperbranched Poly(amidoamine)-grafted Silica Nanoparticles and Their Properties

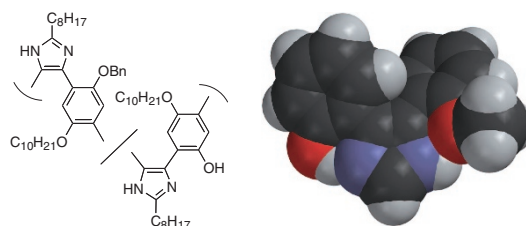
Hyperbranched poly(amidoamine)-grafted silica nanoparticles having BF_3 -amine complex groups (Silica-PAMAM: BF_3) have an ability to cure epoxy resin to give a novel epoxy resin/silica nanocomposite. The glass-transition temperature of the nanocomposite cured by Silica-PAMAM: BF_3 was much higher than that by ethylene diamine in the presence of untreated silica. The glass-transition temperature of the nanocomposite increased with increasing content of hyperbranched PAMAM-grafted silica. It is expected that silica nanoparticles are incorporated uniformly with chemical bonds in the continuous epoxy resin network.



M. UKAJI, M. TAKAMURA, K. SHIRAI, W. GANG,
T. YAMAUCHI, and N. TSUBOKAWA
Vol. 40, No. 7, pp 607–613 (2008)

Conjugated Oligomers Containing Imidazole in Main Chain with Intramolecular Hydrogen Bonding

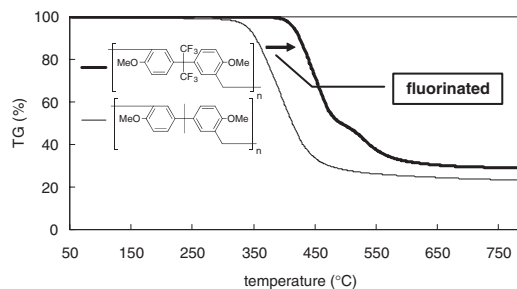
Two kinds of conjugated oligomers containing benzimidazole or imidazole moieties were synthesized. The deprotection of phenolic hydroxyl groups caused red-shifts of UV and PL spectra. For a oligomer bearing the deprotected hydroxyl group, the increase of solvent polarity and the addition of base brought about the blue-shift of spectra, but the change from the solution to film state induced ignorable shifts. These findings support two intramolecular hydrogen bondings and a non-planar conformation in the conjugated oligomer.



K. TAKAGI, K. SUGIHARA, J. OHTA, Y. YUKI,
S. MATSUOKA, and M. SUZUKI
Vol. 40, No. 7, pp 614–621 (2008)

Synthesis and Properties of Fluorine-Containing Poly(arylenemethylene)s as New Heat Resistant Denatured Phenolic Resins

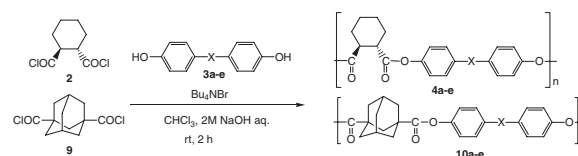
The synthesis of fluorine-containing poly(arylenemethylene)s as a new heat-resistant denatured phenolic resin is described. The fluorinated novolacs (**2a**) (M_n 8,200, M_w/M_n 2.1) was prepared by polymerization of 2,2-bis(4-methoxyphenyl)hexafluoropropane with formaldehyde. From the ^1H NMR and ^{13}C NMR spectra, the polymer had arylene-methylene units on the polymer backbone. The temperature at 10% loss in weight (T_{10}) of **2a** was found to be 425 °C. The thermal stability of poly(arylenemethylene)s was enhanced by the introduction of fluorine moieties in the polymer.



T. NEMOTO, G. KONISHI, T. ARAI, and T. TAKATA
Vol. 40, No. 7, pp 622–628 (2008)

Facile Syntheses of Aromatic Polyesters Bearing Alicyclic Units in the Main Chains

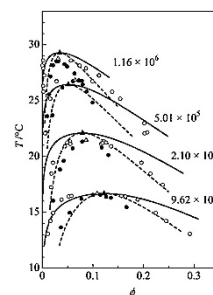
Interfacial polycondensation of cyclohexanedicarbonyl dichlorides and adamantanedicarbonyl dichloride with bisphenols **3a-e** in 2 M NaOH aq./CHCl₃ afforded semi-aromatic polyesters. Almost of the resulting polyesters **4** and **10** exhibit excellent thermal stability, solubility in organic solvents, and transparency.



K. MAEYAMA, K. AKIBA, and H. SAITO
Vol. 40, No. 7, pp 629–633 (2008)

Light Scattering and Phase Separation Studies on Cyclohexane Solutions of Six-Arm Star Polystyrene

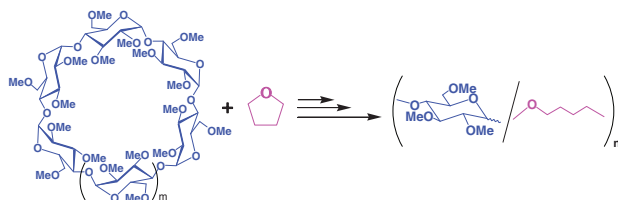
Light scattering and phase separation experiments were carried out for four six-arm star polystyrene samples with different molecular weights in cyclohexane. Empirical equations derived from the light scattering data allowed us to calculate the phase diagrams. The figure shows the observed and calculated binodals (unfilled circles and solid lines, respectively), spinodals (filled circles and dashed lines, respectively), and critical points (unfilled and filled triangles, respectively) for the sample molecular weights indicated.



Y. TASAKA, M. OKUMOTO, Y. NAKAMURA, and T. NORISUYE
Vol. 40, No. 7, pp 634–639 (2008)

Cationic Ring-Opening Copolymerization of *O*-Permethylocyclodextrin with Tetrahydrofuran

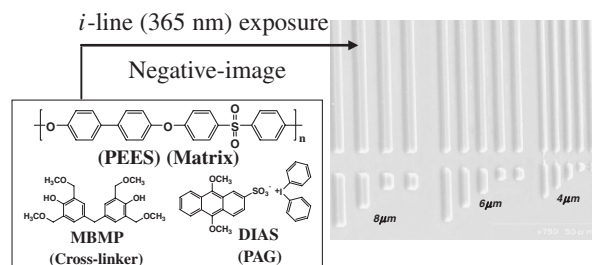
Cationic ring-opening copolymerizations of *O*-Permethylocyclodextrins (MeCDs) with tetrahydrofuran (THF) were studied. In THF that is the comonomer as well as the solvent, MeOTf as the initiator produced the copolymer consisting of tri-*O*-methylglucopyranose and tetramethylene ether units, while Et₃O⁺PF₆⁻ mainly conducted the homopolymerization of THF. The addition of CH₂Cl₂ as the cosolvent favorably promoted the polymerization of MeCDs, producing the copolymer from both initiators. Interestingly, the initiator system of HI/I₂ was found to chemoselectively polymerize MeCDs even in THF.



M. SUZUKI and T. SHIMAZAKI
Vol. 40, No. 7, pp 640–644 (2008)

Direct Patterning of Poly(ether ether sulfone) Using a Cross-linker and a Photoacid Generator

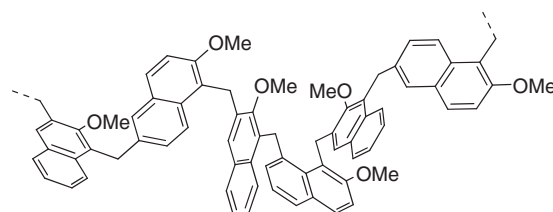
A negative-type photosensitive poly(ether ether sulfone) (PSPEES) based on poly(oxybiphenyl-4,4'-diyoxy-1,4-phenylenesulfonyl-1,4-phenylene) (PEES), a novel cross-linker 4,4'-methylene-bis[2,6-bis(methoxymethyl)phenol] (MBMP) having good compatibility with PEES, and diphenyliodonium 9,10-dimethoxyanthracene-2-sulfonate (DIAS) as a photoacid generator (PAG) has been developed. This excellent methodology using MBMP could be applicable for high performance engineering plastics such as poly(phenylene ether), polycarbonate, and polythiophene as matrix polymers.



K. MIZOGUCHI and M. UEDA
Vol. 40, No. 7, pp 645–650 (2008)

Synthesis and Properties of New Organosoluble Alkoxyated Naphthalene-Based Novolacs Prepared by Addition-Condensation of Mono- or Di-alkoxynaphthalene with Formaldehyde

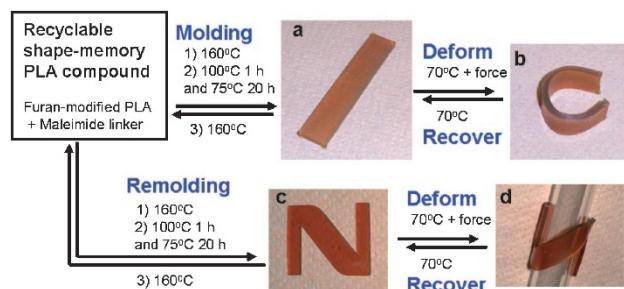
The preparation of new alkoxyated naphthalene-based novolacs by addition-condensation of methoxynaphthalene with formaldehyde is described. The polymerization of 2-methoxynaphthalene with an equimolar amount of formaldehyde proceeded to give **2** (M_n 3100, M_w/M_n 1.7) in good yield. The FT-IR, ¹H and ¹³C NMR spectra suggest that **2** have naphthylene-methylene units and consist of approximately linear polymer backbones. From the TGA, T_{10} (the temperature at 10% loss in weight) value of **2** was 402 °C. The alkoxyated naphthalene-based novolacs have good thermal stability.



T. NEMOTO and G. KONISHI
Vol. 40, No. 7, pp 651–656 (2008)

Recyclable Shape-memory and Mechanical Strength of Poly(lactic acid) Compounds Cross-linked by Thermo-reversible Diels-Alder Reaction

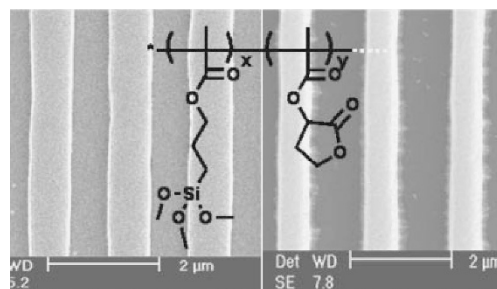
We developed poly(lactic acid) (PLA) compounds which achieved recyclable shape-memory and practical strength. The PLA compounds were cross-linked by the Diels-Alder cyclo-addition between furan and maleimide functions. The cross-linking condition was optimized to increase a reaction ratio between furan and maleimide functions, and the increase in the reaction ratio decreased the defects in its structure and enhanced its strength. Furthermore, using a flexible maleimide linker induced relaxation of the inner strain in the PLA compound also enhanced its strength.



M. YAMASHIRO, K. INOUE, and M. IJI
Vol. 40, No. 7, pp 657–662 (2008)

Room Temperature Processable Organic-Inorganic Hybrid Photolithographic Materials Based on a Methoxysilane Cross-Linker

A novel organic-inorganic hybrid resist material containing a trimethoxysilane cross-linker was synthesized by copolymerization of 3-methacryloxypropyltrimethoxysilane and γ -butyrolactonyl methacrylate. This new resist system does not need the post-exposure baking step thereby eliminating the post-exposure delay problems. The initial lithographic evaluation of the resist showed the potential of the new platform for the next generation resist.



J. Y. PARK and J.-B. KIM
Vol. 40, No. 7, pp 663–666 (2008)