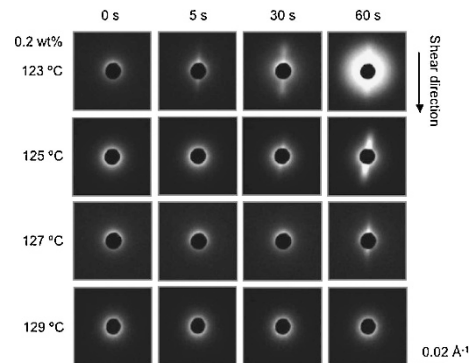


Quantum Beam Studies on Polymer Crystallization under Flow

T. KANAYA, G. MATSUBA, Y. OGINO, N. TAKAHASHI, and K. NISHIDA

[Special Issues -Synchrotron Radiation and Neutron Beam- Review Article] Vol. 39, No. 11, pp 1085–1097 (2007)

We review our recent experiments on polymer crystallization under flow using time-resolved depolarized light scattering (DPLS), small-angle and wide-angle X-ray scattering (SAXS and WAXS) and small-angle neutron scattering (SANS) in a wide spatial scale from 0.1 nm to several tens micrometer. The DPLS and SAXS studies revealed that the shish-kebab formation is governed by a competition between the crystallization rate and the chain relaxation rate. SANS study showed that a long cylindrical object 2 μm in diameter and 12 μm in length was formed from deformed network of ultra-high molecular weight components, which included three shishes (or extended chain crystals) 9 nm in diameter.

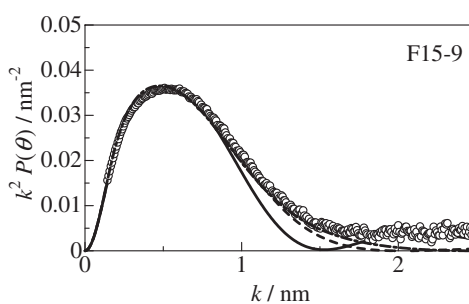


Synchrotron Small-Angle X-ray Scattering from Polystyrene Polymacromonomers in Toluene

Y. NAKAMURA, M. SUGIYAMA, K. AMITANI, and T. NORISUYE

[Special Issues -Synchrotron Radiation and Neutron Beam- Regular Article] Vol. 39, No. 11, pp 1098–1104 (2007)

Particle scattering function $P(\theta)$ for polystyrene polymacromonomer F15-9 (degrees of polymerization of main and side chains are 106 and 15, respectively) in toluene at 25 °C is displayed in the form of $k^2P(\theta)$ against k (the magnitude of the scattering vector). Solid, dashed, and dot-dashed lines represent the theoretical curves for the wormlike cylinder with a uniform cross section, the wormlike chain with Gaussian distribution within the cross-sectional plane, and the touched-bead comb with wormlike main and side chains, respectively.

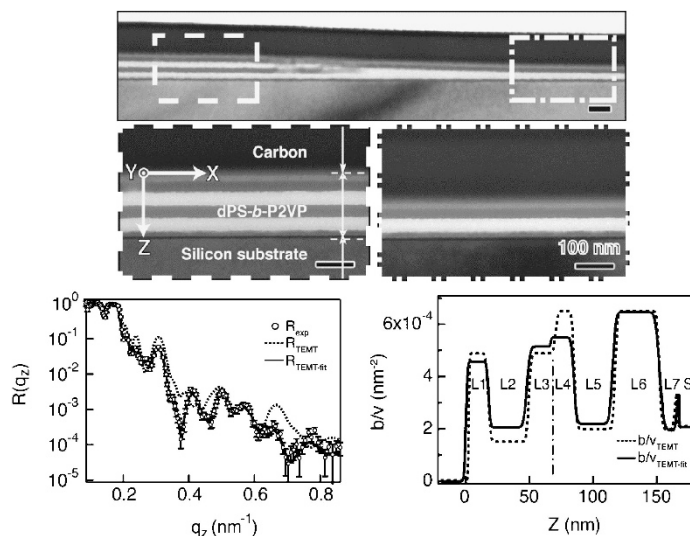


A Neutron Reflectivity Study on a Terraced Lamellar Morphology in a Block Copolymer Thin Film

K. NIIHARA, U. MATSUWAKI, N. TORIKAI, K. SATOH, M. KAMIGAITO, and H. JINNAI

[Special Issues -Synchrotron Radiation and Neutron Beam- Regular Article] Vol. 39, No. 11, pp 1105–1111 (2007)

A microphase-separated structure of a poly(deuterated styrene-*block*-2-vinylpyridine) (dPS-*b*-P2VP) block copolymer thin film was studied by neutron reflectivity (NR). The dPS-*b*-P2VP thin film formed a terraced lamellar structure. Based on the structural informations obtained by transmission electron microtomography, a scattering length density profile along the depth direction, b/v_{TEMT} , was evaluated, which was then used as an initial profile in the conventional model fitting method. An excellent best-fit to R_{exp} was obtained using b/v_{TEMT} , even though the thin film had the terraced structure.

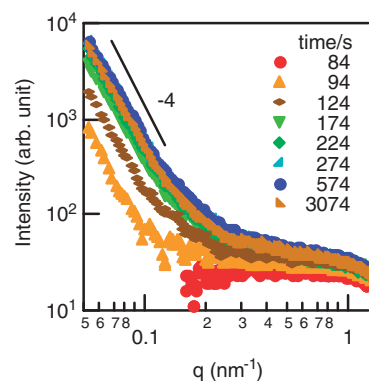


Self-Assembling in Polymerization Processes of N-Isopropylacrylamide

M. TAKENAKA, N. IWASE,
S. NISHITSUJI, and K. ITO

[Special Issues -Synchrotron Radiation
and Neutron Beam- Regular Article]
Vol. 39, No. 11, pp 1112–1116 (2007)

The self-assembling processes during the polymerization of N-Isopropylacrylamide (NIPA) was investigated with time-resolved small angle X-ray scattering (SAXS). During the polymerization process at 35.0 °C which is above the cloud point curve of poly-N-Isopropylacrylamide (PNIPA)/water solution, the phase separation occurs simultaneously. The SAXS profile can be well expressed by the sum of Porod law and Ornstein-Zernike form.

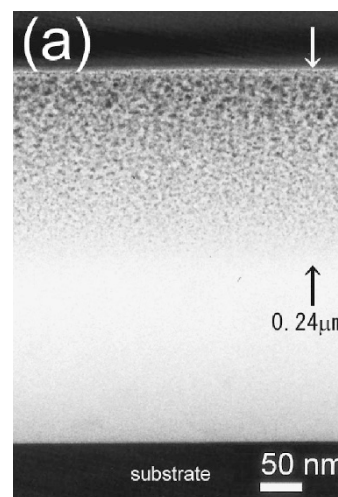


Preparation and Structure of Copper Nanoparticles-polysilane Composite Film

J. KAMADA, M. TAKAHASHI, K. IWATA,
K. GOTO, H. WATANABE, and S. TAMAI

[Short Communication]
Vol. 39, No. 11, pp 1118–1119 (2007)

Poly(phenylhydrogensilane) (PPHS) was found to have an extremely high reductive ability for reducing Cu(OCOCH₃). Dipping a thin film of PPHS in an acetonitrile dispersion of a Cu(OCOCH₃) under nitrogen at room temperature, Cu(OCOCH₃) was reduced to Cu metal and copper nanoparticles-polysilane composite film was obtained.

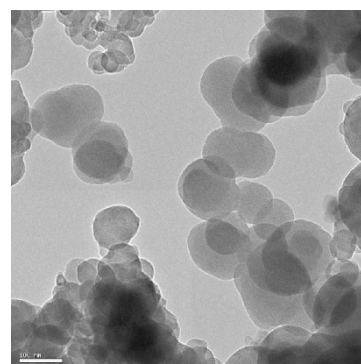


Template-Directed Synthesis of Lamellar Polystyrene Nanomaterial

J. J. GUO and X. Y. LI

[Short Communication]
Vol. 39, No. 11, pp 1120–1121 (2007)

A novel polymer nanomaterial-lamellar polystyrene nanomaterial was prepared by free-radical polymerization in surfactant liquid-crystal template. The thickness of the lamellar polystyrene nanomaterial was uniform and only several nanometers. The plane of lamellar polystyrene nanomaterial was smooth and irregular. Morphology of L-PS strongly depended on the surfactant liquid-crystal template. This research provides a general and versatile technique for preparing novel polymer nanomaterial.



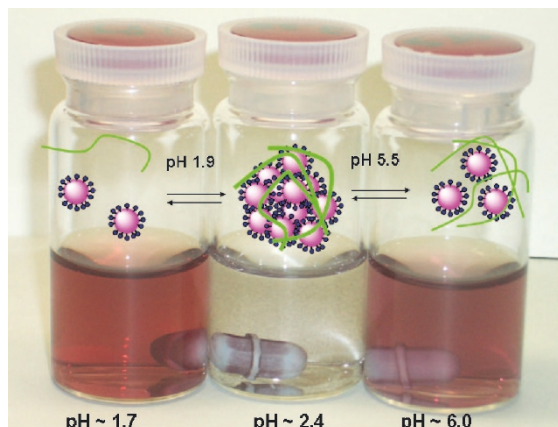
pH Responsive Aggregation of Imidazolium Cations-Modified Gold Nanoparticles with Poly(acrylic acid) in Aqueous Solution

K. NAKA, H. TANAKA, and Y. CHUJO

[Regular Article]

Vol. 39, No. 11, pp 1122–1127 (2007)

The gold nanoparticles were precipitated when PAA ($M_w = 25000$) was added in aqueous solution of which pH was 2.4. The precipitate was redissolved when the solution's pH dropped below pH 1.9 and rose above pH 5.5. The gold nanoparticles at lower pH ($pH < 1.9$) were well redispersed in aqueous solution and aggregates with a diameter of 115 ± 21 nm of the gold nanoparticles were formed at above pH 5.5. Effect of molecular weights of PAA was also studied.



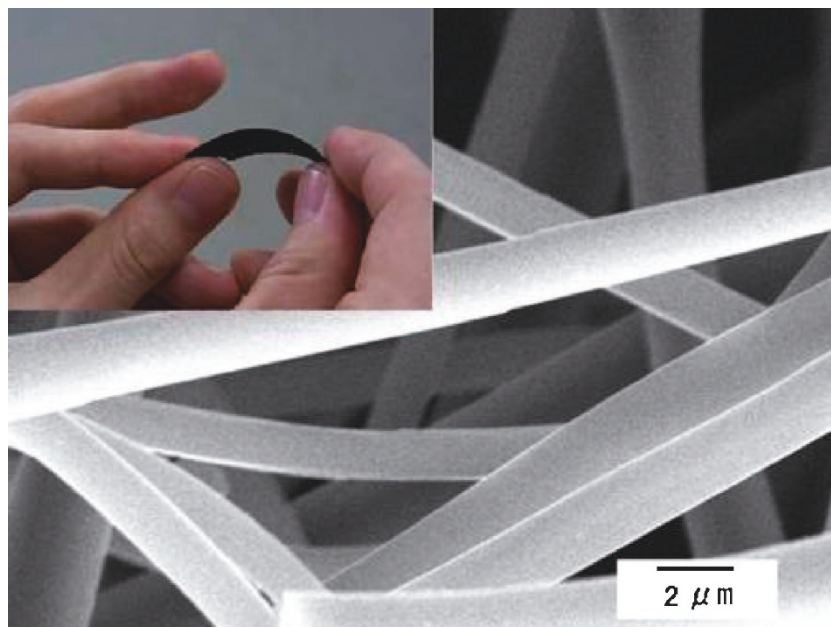
Preparation of Carbon Fiber Fabrics from Phenolic Resin by Electro spray Deposition

K. SUZUKI, H. MATSUMOTO,
M. MINAGAWA, M. KIMURA,
and A. TANIOKA

[Regular Article]

Vol. 39, No. 11, pp 1128–1134 (2007)

Flexible carbon fiber fabrics of 1.7 μm diameter fiber were prepared by electro spray deposition from phenolic resin/poly(vinyl butyral) and successive curing and carbonization. In the present study, the phenolic resin of thermostable polymer was used for electro spray deposition and successive carbonization. An addition of poly (vinyl butyral) ($M_w = 110,000$) improved the dimensional stability of the as-deposited fabrics. After carbonization of the as-deposited fabrics, the flexible carbon fiber fabrics were obtained.



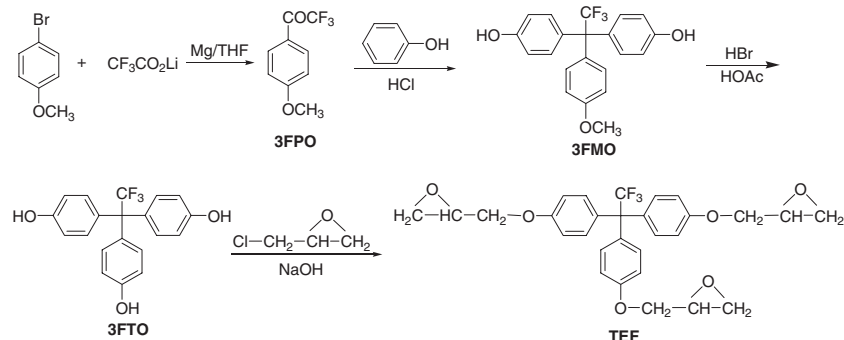
Synthesis and Characterization of Novel Trifunctional Fluorine Containing Epoxy Resins Based on 1,1,1-Tris(2,3-epoxypropoxyphenyl)-2,2,2-trifluoroethane

Z. GE, Z. TAO, J. LIU,
L. FAN, and S. YANG

[Regular Article]

Vol. 39, No. 11, pp 1135–1142 (2007)

A novel trifunctional fluorine containing epoxy, TEF was synthesized and cured with alicyclic anhydride or aromatic diamines to produce the epoxy resins. Experimental investigation indicated that TEF epoxy resins showed higher T_g (210–287 °C, DMA) and improved dielectric properties as well as Low CTE (46.7–59.6 ppm/°C), as comparison with those of commercial BPA ones, which are promising candidates for advanced microelectronic packaging.



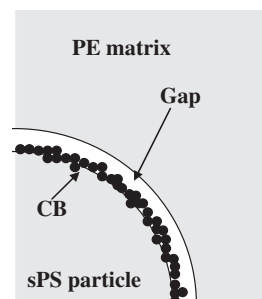
Electrical Properties of Non-Crosslinked Polyethylene/Syndiotactic Polystyrene Composites Filled with Carbon Black

K.-B. YOON, G. H. LEE,
W. Y. CHOI, and D. H. LEE

[Regular Article]

Vol. 39, No. 11, pp 1143–1149 (2007)

Carbon black (CB)-filled high density polyethylene (HDPE)/syndiotactic polystyrene (sPS) composites were prepared by the conventional melt-mixing procedure. The CB particles were preferentially attracted to the sPS droplets which constitute the dispersed phase within the HDPE matrix. The high PTC intensity of CB-filled HDPE composites can be achieved by using a very high melting semicrystalline polymer as one of its component.



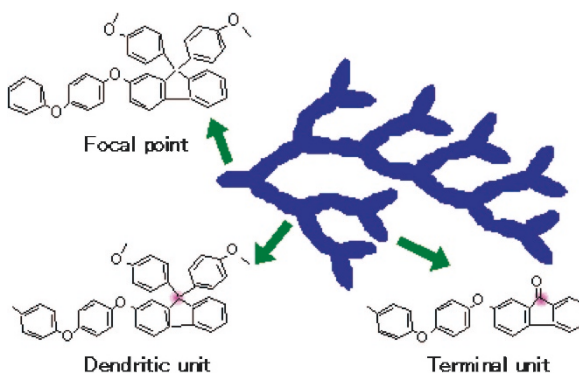
Synthesis of Hyperbranched Polymer with Degree of Branching of Approximately 100% by Polycondensation of 2-(4-Phenoxyphenoxy)fluorenone

S. KONO, W. SINANANWANICH,
Y. SHIBASAKI, S. ANDO, and M. UEDA

[Regular Article]

Vol. 39, No. 11, pp 1150–1156 (2007)

An approximately 100% branched hyperbranched polymer was successfully prepared using 2-(4-phenoxyphenoxy)fluorenone as a monomer in acidic medium. The kinetics of the model reaction between 9-fluorenone and anisole was investigated. The polymer obtained was characterized by FT/IR and, ^{13}C NMR spectroscopy, which confirmed that the polymer was an almost 100% branched hyperbranched polymer.



Formation of Stable Holographic Polymer Dispersed Liquid Crystal Grating with High Diffraction Efficiency Assisted by *in situ* Hydrolysis-Condensation of Trialkoxysilylalkyl Group of Methacrylate Component

Y. H. CHO, G. SUZUKI, and Y. KAWAKAMI

[Regular Article]

Vol. 39, No. 11, pp 1157–1166 (2007)

Combination of low concentration of trimethylolpropane triacrylate and 3-methacryloxypropyltriethoxysilane with urethane function inserted as the spacer together with liquid crystal TL 203, gave polymer dispersed holographic grating with high diffraction efficiency, by the assistance of enhancement of hydrolysis of triethoxysilyl group by moisture. Optimum balance of the formation of polymer matrix by radical polymerization together with cross-linking by hydrolysis condensation seems to be realized.

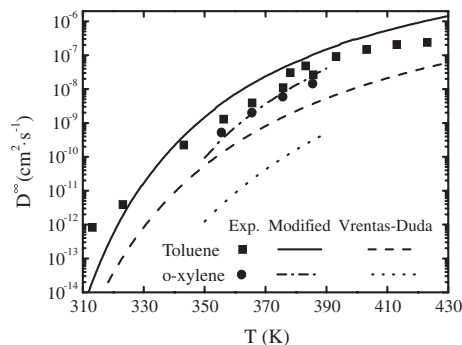
A Group Contribution-Based Model to Predict Organic Solvent Diffusivities in Amorphous Rubbery Polymers

H. LV, B. WANG, and J. YANG

[Regular Article]

Vol. 39, No. 11, pp 1167–1171 (2007)

A group contribution-based model was developed to predict solvent diffusion coefficients in amorphous rubbery polymers. Since all of the parameters with respect to the polymer can be determined by the group contribution method, this model provides feasibility to correlate the solvent diffusivities with polymer structures, without the knowledge of any diffusion or viscoelastic data. Calculations of solvent diffusion coefficients were generally consistent with the published experimental results over a wide temperature range.



Experimental data and predictions for infinite dilution diffusion coefficients of toluene and *o*-Xylene in PVAc.

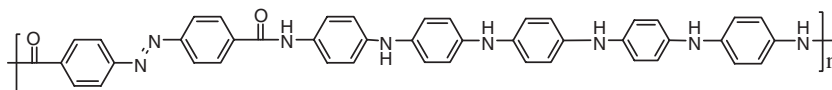
Electroactive Azo Polyamide Based Oligoaniline: Synthesis and Characterization

L.-B. HE, H.-P. MAO, D.-M. CHAO, and W.-J. ZHANG

[Regular Article]

Vol. 39, No. 11, pp 1172–1176 (2007)

An alternating copolymer, electroactive azo polyamide was prepared by oxidative coupling polymerization of oligoaniline macromonomer and *p*-phenylenediamine.



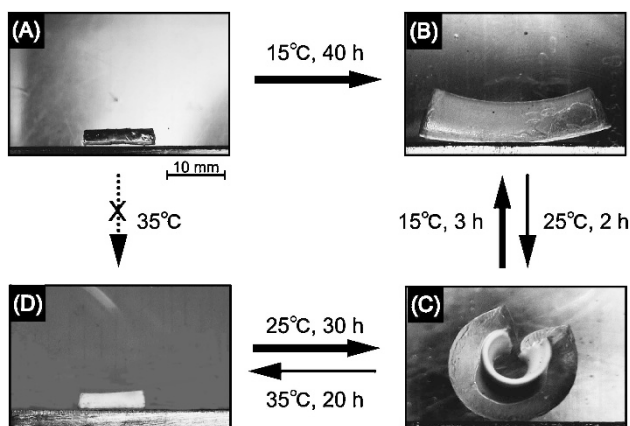
Synthesis and Swelling/De-swelling Behavior of Core-Shell Type Gel Consisting of Two Different Poly(*N*-alkylacrylamide) Gel Layers

T. IIZAWA, A. TERAOKA, M. OHUCHIDA, Y. MATSUURA, and Y. ONOHARA

[Regular Article]

Vol. 39, No. 11, pp 1177–1184 (2007)

The semi-cylindrical core-shell type gel (A) containing a poly(*N*-*n*-propylacrylamide) shell layer and poly(*N*-isopropylacrylamide) core was prepared by cutting the corresponding cylindrical gel into two halves. The semi-cylindrical gel was markedly bent in water at temperatures between the lower critical solution temperatures of both layers, since it was not symmetric with respect to the axis. The deformations among the swelled gel (B), the bent gel (C), and the de-swelled gel (D) occurred reversibly in response to the stepwise temperature changes.



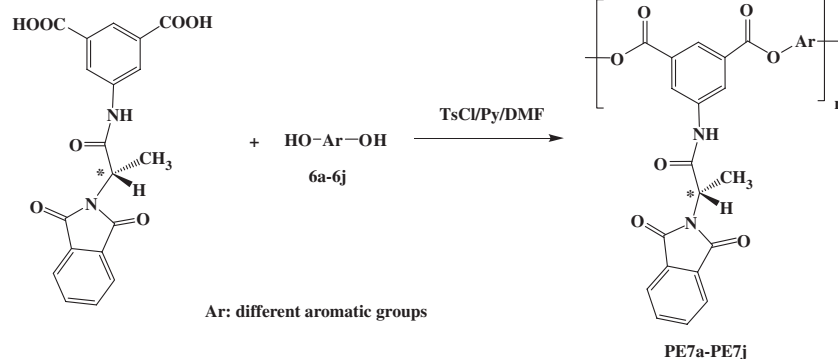
Synthesis and Characterization of Novel Organosoluble, Thermal Stable and Optically Active Polyesters Derived from 5-(2-Phthalimidiylpropanoylamino)isophthalic Acid

S. MALLAKPOUR and Z. RAFIEE

[Regular Article]

Vol. 39, No. 11, pp 1185–1192 (2007)

5-(2-Phthalimidiylpropanoylamino)isophthalic acid as a novel diacid monomer containing phthalimide and flexible chiral groups was synthesized. A series of novel optically active polyesters (PE)s containing phthalimide group was prepared by reaction of diacid with several aromatic diols *via* direct polyesterification with tosyl chloride/pyridine/*N,N*-dimethylformamide system as a condensing agent. The resulting new polymers were obtained in high yields and inherent viscosities ranging between 0.21 to 0.81 dLg⁻¹. The resulting PEs have good thermal stability as well as excellent solubility.



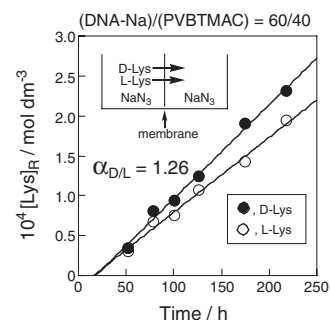
Optical Resolution of Racemic Amino Acids through DNA-Poly(4-vinylbenzyl)-trimethylammonium Polyion Complex Membranes

M. YOSHIKAWA, M. MARUHASHI, Y. IWAMOTO, and N. OGATA

[Regular Article]

Vol. 39, No. 11, pp 1193–1198 (2007)

Novel polyion complex membranes were prepared from DNA sodium salt and poly(4-vinylbenzyl)trimethylammonium chloride. Those polyion complexes gave durable membranes. DNA-poly(4-vinylbenzyl)trimethylammonium polyion complex membranes thus obtained transported D-Lys from racemic Lys mixtures. The permselectivity toward D-Lys reached 1.26. It was revealed that chiral separation was expressed mainly by diffusivity selectivity, while L-Lys was incorporated into the polyion complex membrane in preference to the corresponding D-isomer.



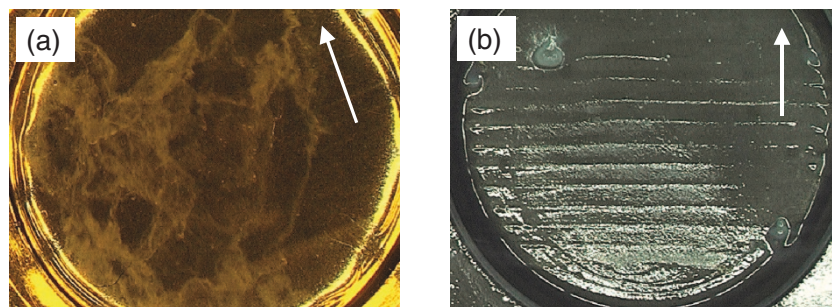
Filtration-Assisted Magnetic Micropatterning of Bacterial Cellulose

T. KIMURA, T. KAMIOKA, and S. KUGA

[Note]

Vol. 39, No. 11, pp 1199–1201 (2007)

Fibrils of bacterial cellulose floating in the cultivation medium are hardly trapped because most fibrils stay away from the trapping zone (a). On the other hand, the fibrils reach the filter surface upon filtration, where they are trapped because the modulation of the magnetic field is effective in the vicinity of the filter surface (b). Arrows indicate the magnetic field.



Preparation of Soluble Polypyrrole with -C≡C-*p*-C₆H₄-hexyl Side Chains at the *N*-Position and Its Self-assembling Behavior

R. YAMASHITA, T. KOIZUMI, S. SASAKI, and T. YAMAMOTO

[Note]

Vol. 39, No. 11, pp 1202–1206 (2007)

A new pyrrole-thiophene copolymer with a -C≡C-*p*-C₆H₄-hexyl side chain at the *N*-position of pyrrole has been prepared. X-ray diffraction and optical data indicate self-assembling behavior of the copolymer.

