EuroSciCon

POSTERS

Abstracts

4th Edition of International Conference on

Polymer Science and Technology

June 04-05, 2018 | London, UK

EuroSciCon

4th Edition of International Conference on
Polymer Science and Technology

June 04-05, 2018
London, UK

Qin Hu, Polym Sci 2018, Volume 4
DOI: 10.4172/2471-9935-C2-012

DETERMINATION OF SEMICARBAZIDE IN FISH BY MOLECULARLY IMPRINTED STIR BAR SORPTIVE EXTRACTION COUPLED WITH HIGH PERFORMANCE LIQUID CHROMATOGRAPHY

Qin Hu
Nanjing Medical University, China

A novel molecularly imprinted stir bar (MI-SB) for sorptive extraction of semicarbazide (SEM) was fabricated in present paper. The coating of the stir bar was characterized by scanning electron microscopy, Fourier-transform infrared spectroscopy, dynamic adsorption and static adsorption tests. In order to optimize the MI-SB extraction operating conditions for the analysis of SEM, extraction and desorption solvents affecting the extraction performance of MI-SB, the extraction and desorption time of MI-SB for SEM were optimized. Under the optimized conditions, the saturated adsorption of MI-SB was about 4 times over that of non-imprinted stir bar (NI-SB). Urea, DMAC, cysteine and NFZ were used to verify the selectivity of MI-SB. The recoveries of the MI-SB for SEM kept almost no changed, and all above 95% when urea, DMAC, cysteine and NFZ were added into SEM solution. The result showed that these analogues of SEM did not affect the adsorption of MI-SB to SEM. The different batches of MI-SBs to adsorb SEM had no significance difference. Moreover, after three extractions for a single MI-SB, the recovery of SEM was 86% with RSD of 4.78% (n=3). The results of experiment revealed that the MI-SB was reproducible and could be used for three times at least. A method to determine SEM was established by coupling MI-SB sorptive extraction with HPLC-UV. The liner range was 1-100 ng/mL for SEM with a correlation coefficient of 0.9985. The limit of detection was about 0.59 ng/mL, which was below the minimum required performance limit of SEM in meat products regulated by European Union. The method was applied to the determination of SEM in fish sample with satisfactory results.

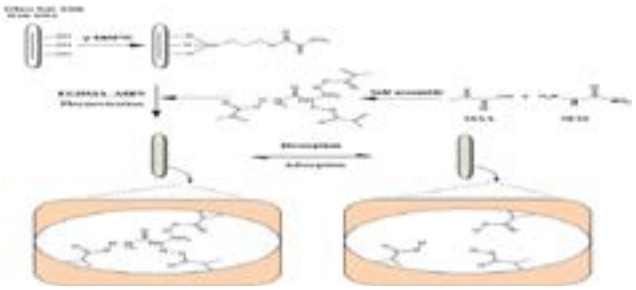


Figure 1: Scheme 1 Schematic representation of the preparation of MIP-SB.

Recent Publications

1. Cooper K.M., Samsonova J.V., Plumpton L., Elliott C.T., Kennedy D.G. (2007) Enzyme immunoassay for semicarbazide-The nitrofuran metabolite and food contaminant, Anal. Chim. Acta 592: 64-71.
2. Gomez-Caballero A., Diaz-Diaz G., Bengoetxea O., Quintela A., Unceta N., Goicolea M.A., Barrio R.J. (2016) Water compatible stir-bar devices imprinted with underivatised glyphosate for selective sample clean-up, J. Chromatogr. A 1451: 23-32.
3. Balbão M.S., Bertucci C., Bergamaschi M.M., Queiroz R.H., MalfaráW.R., Dreossi P.M.L, De S.A., Queiroz M.E. (2010) Rifampicin determination in plasma by stir bar-sorptive extraction and liquid chromatography, J. Pharmaceut. Biomed. 51: 1078-1083.
4. Díaz-Álvarez M., Turiel E., Martín-Esteban A. (2016) Molecularly imprinted polymer monolith containing magnetic nanoparticles for the stir-bar sorptive extraction of triazines from environmental soil samples, J. Chromatogr. A 1469: 1-7.
5. Ling Z., Xu G., Wei F., Jing Y., Qin H. (2015) Determination of melamine in powdered milk by molecularly imprinted stir bar sorptive extraction coupled with HPLC, J. Colloid Interf. Sci. 454: 8-13.
6. Lei Y., Xu G., Wei F., Yang J., Hu Q. (2014) Preparation of a stir bar coated with molecularly imprinted polymer and its application in analysis of dopamine in urine, J. Pharmaceut. Biomed. 94: 118-124.

Biography

Qin Hu has her expertise in preparation of molecularly imprinted polymers, nano carbon dots and quantum dots and their application to the detection of micro materials in life system.

huqin@njmu.edu.cn

EuroSciCon

4th Edition of International Conference on
Polymer Science and Technology

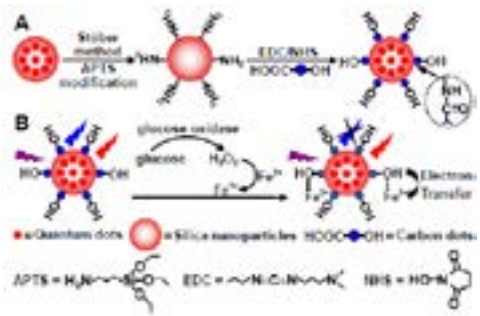
June 04-05, 2018
London, UK

Shuhu Du, Polym Sci 2018, Volume 4
DOI: 10.4172/2471-9935-C2-012

A SINGLE DUAL EMISSIVE NANOPROBE FOR QUANTIFICATION OF SPONTANEOUS GLUCOSE IN HUMAN SERUM

Shuhu Du
Nanjing Medical University, China

In this work, we report a strategy of a single dual-emissive ratiometric fluorescent nanoprobe (QDs@SiO2-CDs) with the controllable ratio of emissive intensities to realize the consecutive color variations from blue to red for the quantification of blood glucose. The red quantum dots (rQDs) were embedded into silica nanoparticles (SiO2 NPs) as an stable internal standard emission, and blue carbon dots (bCDs) were further covalently linked onto the surface of SiO2 NPs, in which the ratiometric fluorescence intensity of blue to red is controlled at 5: 1(from QDs@SiO2-CDs) was thus quenched by the electron transfer from CDs to Fe3+. Meanwhile, the fluorescent intensity (at 630 nm)of rQDs (from Q D s @ SiO2-CDs) keeps almost unchanged. It has been demonstrated that the fluorescence intensity ratio I445/I630 is linearly related to the glucose concentration in the range of 0−75 μM (R2 = 0.989). The calculated detection limit is about 3 μM in terms of the 3σ rule. Consecutive color variations from blue to red with the dosage of glucose can be seen under a 365 nm UV lamp. That is to say, the ratiometric fluorescent probe can be used for the detection of glucose in human serum. The test result show that the spontaneous blood glucose determined by the probe wasalmost in accordance with that measured by a standard glucometer. The method reported here opens a window to the wide applications of the ratiometric fluorescent probe in biological assays.



Scheme 1. Schematic illustration of (A) the synthesis of the dual-emission ratiometric fluorescent probe QDs@SiO2-CDs nanoparticles and (B) the visual detection of glucose.

Recent Publications

1. Shaw, J. E.; Sicree, R. A.; Zimmet, P. Z.(2010) Diabetes Res. Clin. Pract. 87, 4 14.
2. Whiting, D. R.; Guariguata, L.; Weil, C.; Shaw, J.(2011) Diabetes Res. Clin. Pract. 94, 311 321.
3. Han, M.; Gao, X.; Su, J. Z.; Nie, S.(2001) Nat. Biotechnol. 19, 631 635.
4. Jiang, W. X.; Dong, X.; Jiang, J.; Yang,Y. H.; Yang, J.; Lu, Y. B.; Fang, S. H.; Wei, E. Q.; Tang, C.; Zhang, W. P.(2016) Sci. Rep. 6, 20568 20576.
5. Grossi, M.; Morgunova, M.; Cheung, S.; Scholz, D.; Conroy, E.; Terrile, M.; Panarella, A.; Simpson, J. C.; Gallagher, W. M.; O'Shea, D. F. (2016) Nat. Commun. 7,10855 10867.
6. Kamiyama, D.; Sekine, S.; Barsi Rhyne, B.; Hu, J.; Chen, B.; Gilbert, L. A.; Ishikawa, H.; Leonetti, M. D.; Marshall, W. F.; Weissman, J. S.; Huang, B.(2016) Nat. Commun. 7, 11046 11054.
7. Sandanaraj, B. S.; Gremlich, H. U.; Kneuer, R.; Dawson, J.; Wacha, S.(2010) Bioconjugate Chem. 21, 93 101.
8. Zheng, M.; Ruan, S.; Liu, S.; Sun, T.; Qu, D.; Zhao, H.; Xie, Z.; Gao, H.; Jing, X.; Sun, Z.(2015) ACS nano 9, 11455 11461.

Biography

Shuhu Du is working as a professor at Nanjing Medical University, china. On July, 1987−November, 2004, He was doing as research fellow in Anhui Academy of Medical Sciences. His work was for the Drug development research.

shuhudu@njmu.edu.cn

EuroSciCon

4th Edition of International Conference on
Polymer Science and Technology

June 04-05, 2018
London, UK

Xuemin Zhou et al., Polym Sci 2018, Volume 4
DOI: 10.4172/2471-9935-C2-012

DNA-SILVER NANOCLUSTERS MOLECULAR BEACONS AS A NOVEL NANOPROBE FOR SENSITIVE AND LABEL-FREE FLUORESCENT DETECTION OF TRANSCRIPTION FACTORS

Xuemin Zhou, Bingzhi Li, Lei Xu, Yue Chen, Wanying Zhu, Xin Shen, Chunhong Zhu, Jieping Luo, Xiaoxu Li and **Junli Hong**
Nanjing Medical University, China

As a fluorescent bio-molecule functionalized nanomaterial, DNA-silver nanoclusters (DNA-AgNCs) has attracted substantial research interest. Whereas, the application of this material is still focused on detecting nucleic acids and developing aptamer-based sensors, where we believe that the application scope of DNA-AgNCs can be further expanded. Transcription factors (TFs) are key regulators in gene expression, and their dysregulation are involved in numerous diseases. Thus, they are therapeutic targets and potential diagnostic markers. However, present methods for TFs detection are either cumbersome or costly. Herein, we firstly applied DNA-silver nanoclusters molecular beacons (AgMBs) in TFs analysis and designed an assay based on the switchable fluorescence of AgMBs. In the absence of TFs, a single-stranded DNA functioned as a reporter is released from a double-stranded DNA probe (referred as dsTFs probe) under exonuclease III (Exo III) digestion. Then, the reporter triggers downstream Exo III-assisted signal amplification by continuously consuming the guanine-rich enhancer sequences in AgMBs, resulting in significant fluorescent decrease eventually. Conversely, the presence of TFs protects the dsTFs probe from digestion and blocks the downstream reaction to keep a highly fluorescent state. To testify this rationale, we utilized nuclear factor-kappa B p50 (NF-κB p50) as a model TFs. Owing to the amplification strategy, this method exhibited high sensitivity towards NF-κB p50 with a limit of detection of 10 pM, and a broad linear range from 30 pM to 1.5 nM. Furthermore, this method could detect multiple TFs in human colon cancer DLD-1 cells and reflect the variation in their cellular levels after stimulation. Finally, by conducting an inhibition assay we revealed the potential of this method for screening TFs-targeted drugs and calculating the IC50 of corresponding inhibitors.

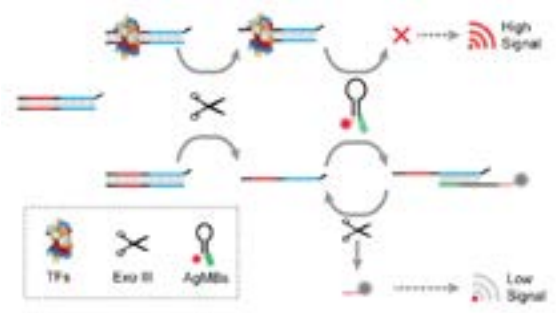


Figure 1: The sensing approach of AgMBs-based TFs assay.

Recent Publications

1. Xu L et al. (2017) G-quadruplex based Exo III-assisted signal amplification aptasensor for the colorimetric detection of adenosine. Anal Chim Acta. 980:58-64.
2. Zhu W et al. (2016) Magnetically controlled electrochemical sensing membrane based on multifunctional molecularly imprinted polymers for detection of insulin. Electrochim Acta. 218:91-100.
3. Han Q et al. (2016) Magnetic sensing film based on Fe3O4@Au-GSH molecularly imprinted polymers for the electrochemical detection of estradiol. Biosens Bioelectron. 79:180-186.

Biography

Xuemin Zhou is a Professor in the School of Pharmacy at Nanjing Medical University, China. Her current research interests include the design and the development of separation method, nanomaterials and electrochemical sensor for the analysis of target molecules in complex matrix.

xueminzhou001_001@hotmail.com

EuroSciCon

4th Edition of International Conference on
Polymer Science and Technology

June 04-05, 2018
London, UK

Monika Paúrová et al., Polym Sci 2018, Volume 4
DOI: 10.4172/2471-9935-C2-012

SYNTHESIS AND CHARACTERIZATION OF POLYPYRROLE NANOPARTICLES

Monika Paúrová and **Michal Babič**
IMC - CAS, Czech Republic

Conducting polymers with extended -conjugated structures have received great attention as multifunctional materials due to their wide range of potential applications in various technological and biological areas such as polymeric rechargeable batteries, corrosion protection, coating layers, electrochromic displays, chemical and biological sensors, functional membranes, drug delivery systems and contrast agents. Among conducting polymers/organic polymer based nanoparticles, polypyrrole (PPy)/polypyrrole nano- and microparticles (PPy-NPs) have attracted a great interest owing to their high conductivity, relatively high stability in different chemical conditions, inert character for biological systems, biocompatible behavior and simplicity of preparation. Development of methods for controlling the size and surface properties of PPy-NPs has been made. PPy-NPs were synthesized via water based redox nanoprecipitation polymerization initiated by an oxidant in the presence of surfactants or soluble polymer stabilizers. To ensure the required size of synthetizing particles and good stability of colloidal dispersion, the reaction mixtures were controlled by the various concentration of organic stabilizers (e.g. polyvinylpyrrolidone (Mw=40000), poly(ethylene glycol) (Mn=4000), sodium dodecyl sulfate, docusate sodium) and specific type of oxidizing agents (e.g. H_2O_2, $(NH_4)2S_2O_8$, $FeCl_3 \cdot 6H_2O$, MnO_2). Morphological studies of prepared materials were investigated by using transmission and scanning electron microscope (TEM and SEM, Figure 1). Hydrodynamic properties, size distribution and zeta potential of the studied particles were measured and determined by dynamic light scattering on Zetasizer (Malvern device). Primary photoabsorption studies were done on UV-Vis spectrometer (Analytic Jena device) as well.

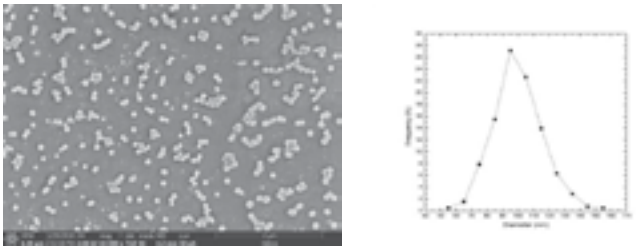


Figure 1: SEM image of PPy-NPs obtained in the presence of PVP (M_w=40000) and $FeCl_3 \cdot 6H_2O$ (left), size distribution of PPy nanoparticles (right).

Recent Publications

1. Men shikova A Yu, Shabsel s B M and Evseeva T G (2003) Synthesis of polypyrrole nanoparticles by dispersion polymerization. Russ. J. Appl. Chem. 76(5):822-826.
2. Pecher J and Mecking S (2010) Nanoparticles of conjugated polymers. Chem. Rev. 110(10):6260-6279.
3. Woo H Y (2010) Synth. Met. 160:588-591.
4. Hazarika J and Kumar A (2013) Controllable synthesis and characterization of polypyrrole nanoparticles in sodium dodecylsulphate (SDS) micellar solutions. Synth. Met. 175:155-162.
5. Vaitkuviene A et al. (2013) Evaluation of cytotoxicity of polypyrrole nanoparticles synthesized by oxidative polymerization. J. Haz. Mat. 250-251:167-174.

Biography

Monika Paúrová obtained her PhD at Charles University, Prague, Czech Republic. She has gained experiences in synthesis of bifunctional ligands for selective metal binding and low-molecular functionalized chelating compounds. She is currently investigating design, synthesis and characterization of composite polymer based on inorganic/polymer nano- and microparticles and their consequent surface modifications/ functionalization for bioapplication (at the Institute of Macromolecular Chemistry of the Academy of Science, Czech Republic).

paurova@imc.cas.cz

EuroSciCon

4th Edition of International Conference on
Polymer Science and Technology

June 04-05, 2018
London, UK

Dae Su Kim et al., Polym Sci 2018, Volume 4
DOI: 10.4172/2471-9935-C2-012

CHARACTERIZATION OF COMPOSITE FILMS PREPARED BY IN-SITU POLYMERIZATION OF STYRENE/BUTYL ACRYLATE IN NANOPOROUS CELLULOSE GELS

Dae Su Kim and **Jyoti Sankar Borah**
Chungbuk National University, Republic of South Korea

Polymer/cellulose composites have attracted lots of interest because they can have high strength to weight ratios, low thermal expansion coefficients, cost competitiveness, and eco-friendliness. To prepare a high performance polymer/cellulose composite the chemical modification of cellulose would be essentially carried out via the hydroxyl groups of cellulose to make the hydrophilic cellulose more compatible to the generally hydrophobic polymer. However, manufacturing a high performance polymer/cellulose composite is still a challenge because of the poor dispersion and distribution of cellulose fillers in a hydrophobic polymer matrix and poor interfacial adhesion between cellulose and the polymer matrix. Most of the published studies on polymer/cellulose composites used natural cellulose fillers (fibers or particles) with native molecular structure. However, nanoporous cellulose gels (NCGs) with regenerated molecular structure can be prepared by dissolution and coagulation of native cellulose molecules and used as fillers to reinforce polymers. Therefore, in this study, film-shape NCGs were prepared first using microcrystalline cellulose powder via (1) dissolution of cellulose chains in an aqueous alkali hydroxide/urea solution and (2) crosslinking of cellulose chains by adding epichlorohydrin to (1). Then, poly(styrene-co-butyl acrylate)/NCG composite films were prepared by in-situ polymerization of each styrene/butyl acrylate (St/BA=3/7~7/3) monomer mixture with benzoyl peroxide 1% as an initiator in the NCGs. A monomer mixture was imbedded in the cavities of an NCG first then in-situ polymerized at 50°C for 12 h. The NCG contents in the composite films were controlled from 16 vol.% to 44 vol.% by controlling the dewatering level of the pristine nanoporous cellulose hydrogel using different compression forces. The composite film prepared with St/BA=3/7 monomer mixture was highly transparent (~82%) in the visible region and showed excellent tensile and dynamic mechanical properties.

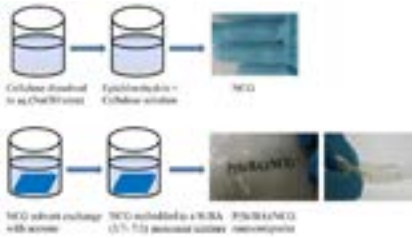


Figure 1: Preparation of NCG and a poly(styrene-co-butyl acrylate)/NCG composite.

Recent Publications

1. Jang S Y and Kim D S (2016) Physical properties of polypropylene composites with hydrophobized cellulose powder by soybean oil. J Appl. Polym. Sci. 133(6):42929.
2. Xu C et al. (2017) Polylactide/cellulose nanocrystal composites: a. comparative study on cold and melt crystallization. Cellulose. 24(5):2163-2175.
3. Tanaka S, Iwata T and Iji M (2016) Solvent effects on heterogeneous synthesis of cardanol- bonded cellulose thermoplastics. Polymer. 99:307-314.
4. Cai J, Kimura S, Wada M and Kuga S (2009) Nanoporous cellulose as metal nanoparticles support. Biomacromolecules. 10(1):87-94.
5. Chang C and Zhang L (2011) Cellulose-based hydrogels: present status and application prospects. Carbohydrate Polymers. 84(1):40-53.

Biography

Dae Su Kim received his BS Degree (Seoul National University, Republic of South Korea), MS and PhD Degree from KAIST, Republic of South Korea all in Chemical Engineering and was a Postdoctoral Fellow at the University of Minnesota at Twin cities. He is a Professor in the Department of Chemical Engineering at Chungbuk National University, Republic of South Korea. He worked as a Senior Researcher in the Laboratory of Polymer Composites at the Korea Research Institute of Chemical Technologies before joining Chungbuk National University in 1994. He was a Visiting Professor at the University of California at Davis, Queensland University and Hokkaido University. His research interests include processing and physical properties of polymer composites and nanocomposites, polymer-filler interfacial interactions, modification of fillers and green polymer composites and nanocomposites with biomass based fillers.

dskim@cbnu.ac.kr

EuroSciCon

4th Edition of International Conference on
Polymer Science and Technology

June 04-05, 2018
London, UK

Ommeaymen Sheikhnejad et al., Polym Sci 2018, Volume 4
DOI: 10.4172/2471-9935-C2-012

EFFECT OF INTERFACE INTERACTION ON THE MECHANICAL PROPERTIES OF THE GRAPHENE REINFORCED NANOCOMPOSITES

Ommeaymen Sheikhnejad[1], Takahiko Nakamoto[2] and **Zoltan Major[1]**
[1]Johannes Kepler University Linz, Austria
[2]Kanazawa University, Japan

Molecular dynamic (MD) model involving a graphene platelet in polymer nanocomposite (GP) was developed in order to investigate the effect of the interface interaction on the mechanical properties of the nanocomposites when subjected to the uniaxial loading. All simulations were done using JOCTA software under COGNAC solver with full atomistic model. Nanocomposites are constructed by embedding graphene platelet into acrylate based polymer under the periodic boundary condition with different interface interaction. Nanocomposites systems underwent NPT (constant number of atoms, pressure and temperature) and NVT (constant number of atoms, volume and temperature) ensemble with applied uniform strain during the MD simulations. In terms of studying the effect of interfacial effect, the van der Waals interaction energy potential between the acrylate polymer and the graphene was changed and the tensile strength and the ultimate stress were investigated. It can be concluded that, increasing the interfacial interaction caused a significant enhancement in mechanical properties of the simulated nanocomposites as a result of the better load transfer between matrix and the filler. It's noteworthy to mention that tensile strength and the ultimate stress also followed similar tendencies. The simulation results demonstrated that the graphene platelet caused an increase in the stiffness relative to the polymer which implied the reinforcement effect of the filler.

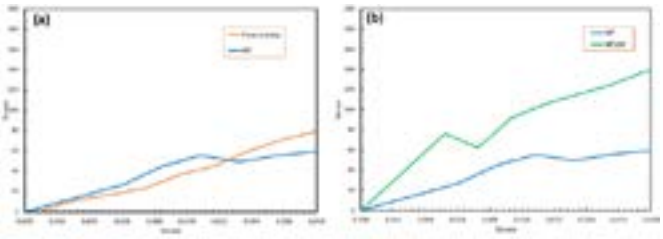


Figure 1: Stress-strain curves comparison of (a) pure matrix and GP, (b) GP and GP100.

Recent Publications

1. Ommeaymen S et al. (2018) Molecular dynamic simulation of carbon nanotube reinforced nanocomposites: the effect of interface interaction on mechanical properties. MOJ Poly. Sci.2(1):00038.
2. Gaoming D and Leon M (2014) Graphene reinforced nanocomposites: 3D simulation of damage and fracture. 95:684-692.
3. Atsushi A, Toshio N and Mitsuhiro S (2012) Atomistic molecular dynamics study of cross-linked phenolic resins. Soft Matter. 8(19):5283-5292.
4. Kaihei T et al. (2014) A computer simulation of the networked structure of a hydrogel prepared from a tetra-armed star prepolymer. Soft Matter.10(20):3553-3559.
5. Sheikh F et al. (2013) Role of nanoparticle dispersion and filler-matrix interface on the matrix dominated failure of rigid C60-PE nanocomposites: a molecular dynamics simulation study. Polymer. 54(10):2565-2576.

Biography

Ommeaymen Sheikhnejad obtained her PhD in the field of Chemical Engineering from Harbin Institute of Technology, China and holds BS and MS degrees in Pure Chemistry and Physical Chemistry respectively. She has experience in both experimental and numerical parts. In her current capacity, she works as a Researcher at the Institute of Polymer Product Engineering (IPPE) at Johannes Kepler University, Austria where she is working on the EU-funded project. She held this position from 2015 until now. At present she is actively participating in both national and international projects. Her main activities include the molecular dynamic simulation and micromechanics simulation of the composites. She is also supporting Bachelor's and Master's student in mechanical testing and simulation of crosslinked hydrogels.

ommeaymen.Sheikhnejad-bishe@jku.at

EuroSciCon

4th Edition of International Conference on
Polymer Science and Technology

June 04-05, 2018
London, UK

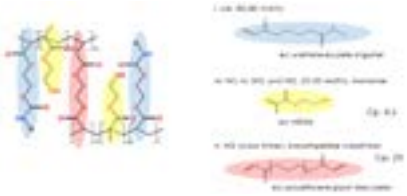
Ji eun Jang et al., Polym Sci 2018, Volume 4
DOI: 10.4172/2471-9935-C2-012

PREPARATION OF BIO-COMPATIBLE AND UV-CURABLE ELASTIC MATERIALS WITH HEMA AS A DILUENT

Ji eun Jang[1], Jung soo Kim[2], Min seong Kim[3], Seok ju Hong[4], Hansoo Park[5], and **Dong hyun Kim[6]**

[1]KITECH, the Republic of KOREA,
[2]KITECH, the Republic of KOREA,
[3]KITECH, the Republic of KOREA,
[4]KITECH, the Republic of KOREA,
[5] Chungang University, the Republic of KOREA,
[6] KITECH, the Republic of KOREA

The biocompatible photo-curable elastic materials were synthesized with urethane acrylate oligomer, 2-hydroxyethyl methacrylate (HEMA), and polyethylene glycol diacrylate (PEGDA) using 2-Hydroxy-4'-(2-hydroxyethoxy)-2-methylpropiophenone (Irgacure 2959) as an initiator. We could obtain elastic materials with different properties such as softness, tensile strength, and elasticity by changing the input molar ratio of HEMA, urethane acrylate with PEGDA. Generally, urethane oligomer with a higher PEGDA ratio has higher elasticity and higher viscosity properties. On the other hand, as the content ratio of HEMA increases in urethane oligomer, the viscosity and physical properties decrease. We studied various properties such as tensile properties, hardness, biocompatible properties, and viscosity to find the critical point of higher elasticity and lower viscosity according to HEMA/PEGDA ratio. Also, the chemical structures of the synthesized polymers were characterized using Fourier Transform Infrared spectroscopy (FT-IR) and nuclear magnetic resonance (NMR).



Recent Publications

1. **Zhang, C., Zhang, N., & Wen, X. (2006). Improving the elasticity and cytophilicity of biodegradable polyurethane by changing chain extender. Journal of Biomedical Materials Research Part B: Applied Biomaterials, 79(2), 335-344.**
2. **Xu, G., & Shi, W. (2005). Synthesis and characterization of hyperbranched polyurethane acrylates used as UV curable oligomers for coatings. Progress in Organic Coatings, 52(2), 110-117.**
3. **Deka, H., Karak, N., Kalita, R. D., & Buragohain, A. K. (2010). Biocompatible hyperbranched polyurethane/multi-walled carbon nanotube composites as shape memory materials. Carbon, 48(7), 2013-2022.**
4. **Lin, Y. H., Liao, K. H., Chou, N. K., Wang, S. S., Chu, S. H., & Hsieh, K. H. (2008). UV-curable low-surface-energy fluorinated poly (urethane-acrylate) s for biomedical applications. European Polymer Journal, 44(9), 2927-2937.**
5. **Chen, Q., Mangadlao, J. D., Wallat, J., De Leon, A., Pokorski, J. K., & Advincula, R. C. (2017). 3D printing biocompatible polyurethane/poly (lactic acid)/graphene oxide nanocomposites: anisotropic properties. ACS applied materials & interfaces, 9(4), 4015-4023.**

Biography

Ji Eun Jang is currently a graduate student in Chungang University and a researcher in Korea Institute of Industrial Technology (KITECH) at the same time. Her major is integrative engineering and she is consistently learning how to do experiments and manage novel materials. She is currently researching biocompatible materials applied for 3D printing. In KITECH, she held experiments regarding superabsorbent polymers and 3D printing resins. This study aimed for innovative experimental results such as biocompatibility and high elasticity for the application of 3D printing materials.

Jejang@kitech.re.kr

EuroSciCon

4th Edition of International Conference on
Polymer Science and Technology

June 04-05, 2018
London, UK

Yoo Jin Kim et al., Polym Sci 2018, Volume 4
DOI: 10.4172/2471-9935-C2-012

THE PROPERTIES OF SUPERABSORBENT POLYMERS SYNTHESIZED WITH ACRYLATE BASED CROSSLINKING AGENTS

Yoo Jin Kim[1], Jung Soo Kim[1], Byeong Kwan Kang[1], Hae Chan Kim[1], Woo Seung Shin[1], Jin Woong Kim[2] and **Dong Hyun Kim[1]**

[1]KITECH, Republic of South Korea
[2]Hanyang University, Republic of South Korea

Super absorbent polymer (SAP) is a cross-linked hydrophilic polymer. It can absorb, swell, and retain aqueous solutions up to hundred times of its own dry weight. We synthesized copolymers consisting of carboxylated vinyl monomer and vinyl sulfonic acid using various crosslinking agent. Crosslinking agent is needed to synthesize SAP and it has a direct effect on the crosslinking density of the SAPs. As the amount of added crosslinking agent increases, the cross-linking density of the SAPs increases. This is related to absorbency. We synthesized the SAPs using four types of acrylate based crosslinking agents to compare absorption properties. As a result, only two of them succeeded in synthesis and the rest did not proceed. Each monomer was neutralized with sodium hydroxide to prepare carboxylate ions. Polymerization was initiated by ammonium persulfate added after the crosslinking agent addition. The structures of the prepared polymers were confirmed by FT-IR (Fourier transform infrared spectroscopy). We have measured SAP's properties such as centrifuge retention capacity (CRC) and absorbency under load (AUL) in 0.9 wt.% saline solution depending on the reaction time, reaction temperature or the amount of the crosslinking agent. We studied the effect of each crosslinking agent on the SAP absorption properties.

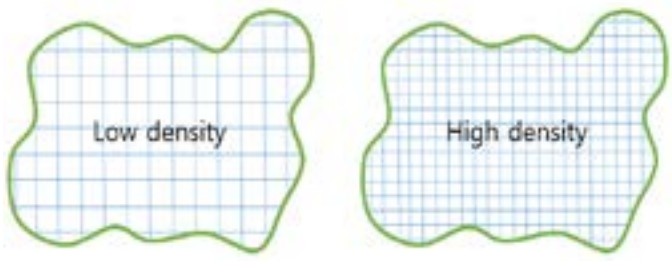


Figure 1. Crosslink density of SAP depending on cross-linking agent

Recent Publications

1. Nádia S V Capanema et al. (2018) Superabsorbent crosslinked carboxymethyl cellulose-PEG hydrogels for potential wound dressing applications. International Journal of Biological Macromolecules. 106:1218-1234.
2. Ajaman Adair et al. (2017) Superabsorbent materials derived from hydroxyethyl cellulose and bentonite: preparation, characterization and swelling capacities. Polymer Testing. 64:321-329.
3. Kyong Ku Yun et al. (2017) Hygral behavior of superabsorbent polymers with various particle sizes and cross-linking densities. Polymers. 9(11)600.
4. Guanghua He et al. (2017) Preparation and properties of quaternary ammonium chitosan-g-poly (acrylic acid-co-acrylamide) superabsorbent hydrogels. Reactive and Functional Polymers. 111:14-21.
5. Hyun Jae Kim et al. (2017) Synthesis of super absorbent polymer using citric acid as a bio-based monomer. Polymer degradation and stability 144:128-136.

Biography

Yoo Jin Kim graduated from Myongji University, Republic of South Korea. She is currently pursuing Master's course at Hanyang University, Republic of South Korea. She majored in Chemistry at bachelor's level and in Bio-Nano Science at the master's level. She is also currently working in Korea Institute of Industrial Technology (KITECH) as a Student Researcher. She is researching on superabsorbent polymer (SAP) using bio-degradable materials that aims to reduce wastes and enhance their absorption properties.

kyj@kitech.re.kr

EuroSciCon

4th Edition of International Conference on
Polymer Science and Technology

June 04-05, 2018
London, UK

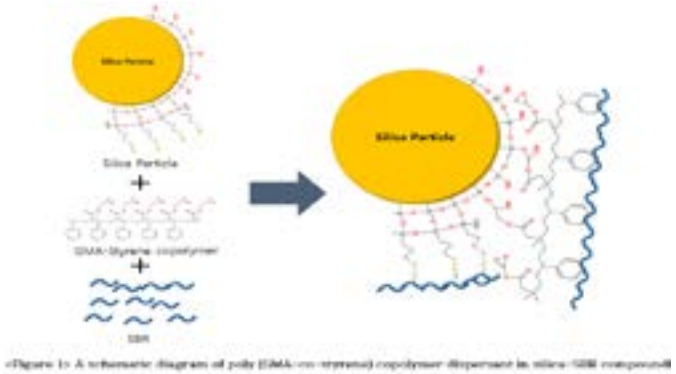
Hae Chan Kim et al., Polym Sci 2018, Volume 4
DOI: 10.4172/2471-9935-C2-012

SILICA DISPERSION IN THE SI-SBR COMPOSITES: SYNTHESIS OF POLY(GLYCIDYL METHACRYLATE-CO-STYRENE) AS A REACTIVE DISPERSANT BY EMULSION COPOLYMERIZATION

Hae Chan Kim[1], Min Seong Kim[1], Seok Ju Hong[1], Woo Seung Shin[1], Yoo Jin Kim[1], Jong Ho Kim[2] and **Dong Hyun Kim[1]**

[1]KITECH, Republic of South Korea
[2]Hanyang University, Republic of South Korea

To disperse silica in SBR matrix, a need for adequate dispersant is long-standing. Proper interactions between SBR and silica are important for improving silica dispersibility between SBR and silica in medium. We prepared poly(glycidyl methacrylate-co-styrene) copolymer as a reactive dispersant by emulsion copolymerization using the sodium persulfate/iron sulfate redox system. The structure of poly (GMA-co-styrene) is an amphipathic copolymer composed of phenyl group and epoxy group. The glycidyl group of GMA and silanol one of Si formed a covalent bond resulting in improving the dispersion of silica in Si-SBR composites. We suggested a possible reaction mechanism for our system. We confirmed the structure of poly(GMA-co-styrene) copolymer using FT-IR spectroscopy. Also, we investigated dispersion effects in Si-SBR composites according to the input molar ratio of monomer in copolymer and content of initiator.



Recent Publications

1. Mei-Chun Li, Xin Ge, and Ur Ryong Cho (2013) Emulsion Grafting Vinyl Monomers onto Starch for Reinforcement of Styrene-Butadiene Rubber, Macromolecular Research, 21(5), 519-528.
2. Yan Gui, Junchi Zheng, Xin Ye, Dongli Han, Meimei Xi, Liqun Zhang (2016). Preparation and performance of silica/SBR masterbatches with high silica loading by latex compounding method. Composites Part B: Engineering 85, 130-139.
3. Shuting.W, Lan.C, Qihao.W. (2015). Maleated glycidyl 3-pentadecenyl phenyl ether with styrene: synthesis and application as compatibilizer in SBR/silica composite. Polym. Adv. Technol, 26(8), 953-959.
4. SEO, Byeongho, et al. Characterization of AN-SBR/Silica compound with acrylonitrile as a polar group in SBR. Macromolecular research, 2013, 21.7: 738-746.
5. XIA, Lin, et al. Preparation of epoxidized Eucommia ulmoides gum and its application in styrene butadiene rubber (SBR)/silica composites. Polymers for Advanced Technologies, 2017, 28.1: 94-01.

Biography

He has a passion for developing new materials using polymer synthesis. He is focusing on developing various materials with a sense of purpose in creating high value-added products through the development of new materials. He is currently working for the Korea Institute of Industrial Technology (KITECH) in the Republic of Korea and is in master's course in Hanyang University.

coolskawk@kitech.re.kr

EuroSciCon

4th Edition of International Conference on
Polymer Science and Technology

June 04-05, 2018
London, UK

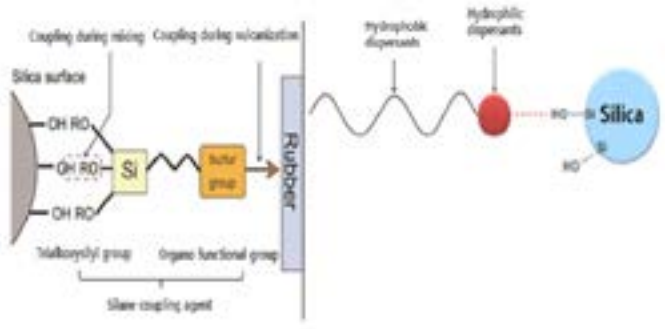
Min Seong Kim et al., Polym Sci 2018, Volume 4
DOI: 10.4172/2471-9935-C2-012

A COMPARATIVE STUDY ON THE DISPERSION EFFECTS OF VARIOUS DISPERSANTS IN MODIFIED SI-SBR COMPOSITES

Min Seong Kim[1], Jung Soo Kim[1], Hae Chan Kim[1], Woo Seung Shin[1], Yoo Jin Kim[1], Young Wook Chang[2] and **Dong Hyun Kim[1]**

[1]KITECH, Republic of South Korea
[2]Hanyang University, Republic of South Korea

The agglomeration of silica-silica in Si-SBR composites deteriorate the many properties of the tire tread rubber. We prepared various dispersants to improve the dispersibility of silica in Si-SBR composites: poly (itaconic acid-co-acrylamide), poly(styrene-co-allyl alcohol), poly(styrene-co-methyl methacrylate), and poly(glycidyl methacrylate-co-styrene). We confirmed the structure and molecular weight of the dispersants using FT-IR and GPC, respectively. The silica loading content in SBR/silica composites was determined using thermal gravimetric analysis. We also investigated curing characteristics, morphology, Payne effect of the Si-SBR composites according to the types of dispersant. As a result, we were able to compare the effect of silica dispersion in the composites.



Recent Publications

1. H Wang, Q Pan and G L Rempel (2012) Organic solvent free catalytic hydrogenation of diene based polymer nanoparticles in latex form: part I. preparation of nano substrate. J. Polym. Sci. Part A: Polym. Chem. 50(22):4656-4665.
2. Yan Gui et al. (2016) Preparation and performance of silica/SBR masterbatches with high silica loading by latex compounding method. Composites Part B: Engineering. 85:130-139
3. J L Valentın et al. (2006) Effect of a fatty amine on processing and physical properties of SBR compounds filled with silane–silica particles. Journal of Applied Polymer Science, 99(6):3222-3229
4. Mei Chun Li, Xin Ge, and Ur Ryong Cho (2013) Emulsion grafting vinyl monomers onto starch for reinforcement of styrene-butadiene rubber. Macromolecular Research. 21(5):519-528.
5. Siddharth A Butani and Sachin Mane (2017) Coagulation/flocculation process for cationic, anionic dye removal using water treatment residuals: a review. International Journal of Science and Technology. 6(4):1-5.

Biography

Min Seong Kim is currently pursuing Master's course in Materials and Chemical Engineering at Hanyang University, Republic of South Korea. He studied synthesis of silica dispersant for the tire tread rubber at the Korea Institute of Industrial Technology (KITECH), Republic of South Korea. He is mainly interested in researching new knowledge through the fusion of inorganic and organic materials.

corvo@kitech.re.kr

EuroSciCon

4th Edition of International Conference on
Polymer Science and Technology

June 04-05, 2018
London, UK

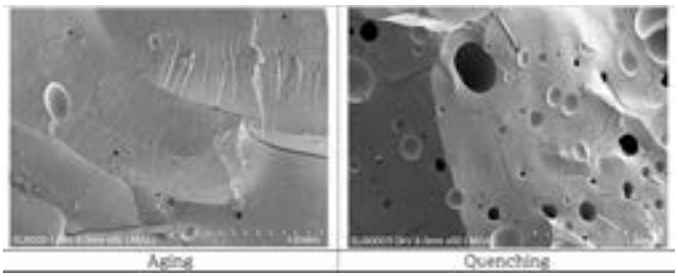
Seokju Hong et al., Polym Sci 2018, Volume 4
DOI: 10.4172/2471-9935-C2-012

POST-TREATMENT PROCESS TO ENHANCE THE PERFORMANCES OF SUPER ABSORBENT POLYMERS

Seokju Hong[1], Byeong Kwan Kang[1], Jungsoo Kim[1], JinHoon Kim[1], JiEun Jang[1], Youngwook Chang[2] and **Donghyun Kim[1]**

[1]KITECH, Republic of South Korea
[2]Hanyang University, Republic of South Korea

As the use of absorbent disposable items such as sanitary napkins and diapers have increased, environmental problems related to waste disposal have been concerned. To resolve this problem, we can use eco-friendly superabsorbent polymer (SAP) with bio-based monomer replacing petroleum based SAP. However, bio-based SAPs have low water absorption properties. In this study, we studied the effects of post-treatment processes to enhance the performances of SAPs. The SAPs were prepared using itaconic acid, vinyl sulfonic acid, tetraethylene glycol diacrylate and ammonium persulfate initiator. Various post-treatment processes (Quenching, Aging, and Annealing) are investigated. After post-treatment processes, we measured free water absorbency, centrifuge retention capacity, and absorption under load of the SAPs. The structure of SAPs was confirmed by FT-IR. The amount of monomer residues of SAP was confirmed by HPLC.



Recent Publications

1. GAO, Jiande, et al. Preparation and properties of novel eco- friendly superabsorbent composites based on raw wheat bran and clays. Applied Clay Science, 2016, 132: 739-747.
2. BANEDJSCHAFIE, Schahram; DURNER, Wolfgang. Water retention properties of a sandy soil with superabsorbent polymers as affected by aging and water quality. Journal of Plant Nutrition and Soil Science, 2015, 178.5: 798-806.
3. ZHOU, Zhiling; YANG, Zhaozhong; LIU, Chaoping. Novel nanocomposite super absorbent polymers reinforced by clay nanosheets. Russian Journal of Applied Chemistry, 2016, 89.2: 324- 329.
4. KIM, Hyun Jae, et al. Synthesis of super absorbent polymer using citric acid as a bio-based monomer. Polymer Degradation and Stability, 2017, 144: 128-136.
5. GUO, Jian-Zhong, et al. Removal of methylene blue from aqueous solutions by chemically modified bamboo. Chemosphere, 2014, 111: 225-231.

Biography

Seokju Hong earned a bachelor's degree from Yonsei University. He is in the master's course from Hanyang University. His bachelor's major was packaging and the master's major is a chemical engineering. He wants to be an expert in the polymer field. He is currently working at Korea Institute of Industrial Technology (KITECH). He is studying SAP and using various methods to perform synthesis and analysis to improve the absorbency of SAP.

tjrwn523@kitech.re.kr

EuroSciCon

4th Edition of International Conference on
Polymer Science and Technology

June 04-05, 2018
London, UK

Wooseung Shin et al., Polym Sci 2018, Volume 4
DOI: 10.4172/2471-9935-C2-012

IMPROVED PERMEABILITY AND ABSORPTION OF SUPERABSORBENT POLYMERS BY USING ETHYLENE GLYCOL DIGLYCIDYL ETHER AS A SURFACE CROSS-LINKING AGENT

Wooseung Shin[1], Hae Chan Kim[1], Jungsoo Kim[1], Ji Eun Jang[1], Youngwook Chang[2] and **Dong Hyun Kim[1]**

[1]KITECH, Republic of South Korea
[2]Hanyang University, Republic of South Korea

Superabsorbent polymers (SAPs) are special polymeric materials that can absorb large amounts of water, saline solutions or physiological fluids as high as 10-1000 times their own weight due to a considerable number of hydrophilic groups in their structure. Recently, a major research trends of SAPs are the relaxation of the gel-blocking phenomenon. Surface cross-linking reduces gel-blocking and improves absorbency under load (AUL). In this study, surface cross-linking was achieved through thermal ring-opening reaction with ethylene glycol diglycidyl ether (EGDGE) as a cross-linking agent. We prepared carboxylated vinyl monomer based SAPs with comonomer. However, the SAPs have low absorption capacity under load (AUL) and low permeability. When EGDGE is used for surface cross-linking agent, the SAPs formed core-shell structure with different cross-linking densities between the exterior and interior. As a result, AUL and permeability of surface cross-linked SAPs were improved. We measured the absorption properties of the surface cross-linked SAPs according to the EGDGE input content, ratio of co-medium, reaction temperature and reaction time

Figure 1: Formation of Core Shell by Surface Crosslinking

Recent Publications

1. **Zohouriaan Mehr M J and Kourosh Kabiri (2008) Superabsorbent polymer materials: a review. 17(6):451-447.**
2. **Zohuriaan Mehr M J et al. (2010) Advances in non-hygienic applications of superabsorbent hydrogel materials. Journal of Materials Science 45(21):5711-5735.**
3. **Jockusch Steffen et al. (2009) Photoinduced surface crosslinking of superabsorbent polymer particles. Journal of Applied Polymer Science. 111(5):2163-2170.**
4. **Moini Nasrin et al. (2016) Simple and efficient approach for recycling of fine acrylic-based superabsorbent waste. Polymer Bulletin. 73(4):1119-1133.**
5. **Moini Nasrin and Kourosh Kabiri (2015) Effective parameters in surface cross-linking of acrylic-based water absorbent polymer particles using bisphenol A diethylene glycidyl ether and cycloaliphatic diepoxide. Iranian Polymer Journal. 24(11):977-987.**

Biography

Wooseung Shin majored in Chemistry from Incheon National University in the Republic of South Korea. During his college years, he worked as an Intern Researcher at the Korea Institute of Industrial Technology (KITECH) and conducted research on tire tread rubber. He is a graduate student in the Department of Materials Science and Chemical Engineering of Hanyang University, Republic of South Korea and also a Researcher in KITECH. He is currently studying SAP's surface cross-linking processes to improve the absorption properties and permeability of the SAPs.

ws300@kitech.re.kr

EuroSciCon

4th Edition of International Conference on
Polymer Science and Technology

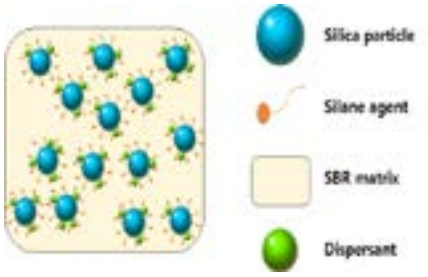
June 04-05, 2018
London, UK

B K Kang et al., Polym Sci 2018, Volume 4
DOI: 10.4172/2471-9935-C2-012

THE SILICA DISPERSING EFFECTS OF SILICA-SBR COMPOSITES WITH DISPERSING AGENT: POLY(STYRENE-ALLYL ALCOHOL) AND POLY(STYRENE-METHYL METHACRYLATE)

B K Kang[1], M S Kim[1], J S Kim[1], Y W Chang[2] and **D H Kim[1]**
[1]KITECH, Republic of South Korea
[2]Hanyang University, Republic of South Korea

The higher silica content in the tire-tread rubber can maximize the efficiency of the vehicle. However, silica does not mix well with other mixtures, including the tire-tread rubber. This phenomenon deteriorates the various properties of the tire-tread rubber. Therefore, we have tried to improve the dispersity of silica in tire-tread rubber by using dispersant. The dispersion of silica in tire-tread styrene-butadiene rubber (SBR) is one of important factors in the mechanical properties of it. We prepared dispersants to enhance silica content and dispersity in SBR using wet master batch (WMB) system. The dispersants were prepared by copolymerization of styrene with allyl alcohol or methyl methacrylate. The synthetic conditions of dispersants were changed to improve the silica loading content and dispersity in WMB system for the preparation of silica-SBR composites. The WMB system was consisted of the steps involving dispersants synthesis, silica modification, dispersion of modified silica in SBR emulsion latex, and coagulation of silica-SBR composites. We confirmed the structure of the dispersants using FT-IR. The content of silica in the composites was measured by thermal gravimetric analysis (TGA) according to the types of dispersants. We also studied the payne effect with rubber process analyzer (RPA) instrument and dynamic viscoelasticity with Dynamic mechanical analysis (DMA) instrument. We measured the mechanical properties of them such as tensile strength and modulus of M300. We found the optimal types and content of dispersants for silica-SBR composites.



Recent Publications

1. Bourgeat Lami E, Espiard Ph and Guyot A (1995) Poly (ethyl acrylate) latexes encapsulating nanoparticles of silica: 1. functionalization and dispersion of silica. Polymer. 36.23:4385-4389.
2. Choi Sung Seen, Park Byung Ho and Song Hanjong (2004) Influence of filler type and content on properties of styrene butadiene rubber (SBR) compound reinforced with carbon black or silica. Polymers for Advanced Technologies. 15.3:122-127.
3. Choi Sung Seen, Nah Changwoon and Jo Byung Wook (2003) Properties of natural rubber composites reinforced with silica or carbon black: influence of cure accelerator content and filler dispersion. Polymer International. 52.8:1382-1389.
4. Yan Gui et al. (2016) Preparation and performance of silica/SBR masterbatches with high silica loading by latex compounding method. Composites Part B: Engineering. 85:130-139
5. Byeongho Seo et al. (2013) Characterization of AN-SBR/Silica compound with acrylonitrile as a polar group in SBR. Macromolecular Research. 21(7):738-746.

Biography

Byeongkwan Kang is currently pursuing Master's Degree in Chemical Engineering at Hanyang University, Republic of South Korea. He is also working at Korea Institute of Industrial Technology (KITECH). Our company research Institute of Industrial Technology Convergence leads Industry Convergence Technology and explores future growth engines to drive the economy by developing and commercializing intelligent robots, high-tech medical fibers, ultra-precision nanotechnology, wellness systems, and packaging technology. He is mainly interested in polymer chemistry such as hydrogel.

90kbk@kitech.re.kr

EuroSciCon

4th Edition of International Conference on
Polymer Science and Technology

June 04-05, 2018
London, UK

Bowen Tan, Polym Sci 2018, Volume 4
DOI: 10.4172/2471-9935-C2-012

INVESTIGATION ON THE MECHANICAL, BARRIER AND DEGRADATION PROPERTIES OF POLYGLYCOLIC ACID SYNTHESIZED VIA RING-OPENING POLYMERIZATION

Bowen Tan
Pujing Chemical Industry, UK

Polyglycolic aicd (PGA) is a biodegradable thermoplastic that has been widely used in biomedical application since 1964. The polymer chain is the simplest aliphatic polyester, giving rise to high stereo-regularity and hence results in high crystallinity for PGA. Because of this molecular structure, PGA possesses superior properties in both mechanical and gas barrier performances. The tensile strength of high molecular weight PGA is much higher than that of polylactic acid (PLA) and polyethylene terephthalate PET. O2 barrier property of PGA was extremely better than that PLA, PET and other commercialized packaging polymers. As a biodegradable polymer, PGA can be fully degraded into water and CO2 via hydrolytic decomposition. The degradation rate of PGA can be within 20-50 days depending on the environment, such as pH, humidity, and temperature. In the present study, the high molecular weight PGA sample was synthesized from ring-opening polymerization of glycolide with SnCl2 catalyst. The weight average molecular weight of the sample was measured to be 187150 and the crystallinity was 481%. Mechanical property of the PGA sample was tested and compared with PLA, poly(butylene adipate-co-terephthalate) (PBAT) and PET. O2 permeability of the PGA sample was measured from compression moulding sheets (thickness 0.61mm). The O2 permeability of the PGA sheets was found 100 times lower than that of PLA. The degradation of PGA in water at different temperatures was measured and the effects of pH and temperature on the rate of degradation were investigated.

Recent Publications

1. **W.Liu and C. Sun (2016) CN205575974U Screw extruder and have this screw extruder's cyclic annular lactide preparation facilities, China**

Biography

Dr. Bowen Tan is working as a marketing manager at Pujing Chemical Industry Co., Ltd. She obtained her first degree from Sichuan University, China and a Ph.D. in the barrier property of bio-based polymer membrane from Loughborough University. Bowen's research interests lie in the field of bio-based and bio-degradable polymer. She has been investigating polyglycolic acids (PGA) for many years and has expertise on the processing and characterization of PGA products. She is Lead/co-author of papers published in well-regarded industrial and professional journals and presenter at international research conferences.

tanbowen@pjchem.com

EuroSciCon

E-POSTER

Abstracts

4th Edition of International Conference on

Polymer Science and Technology

June 04-05, 2018 | London, UK

EuroSciCon

4th Edition of International Conference on
Polymer Science and Technology

June 04-05, 2018
London, UK

Momen S A Abdelaty, Polym Sci 2018, Volume 4
DOI: 10.4172/2471-9935-C2-012

RESPONSIVE-RESPONSIVE ASSEMBLY FUNCTIONAL PHOTO-CROSS-LINKED HYDROGEL BILAYER THIN FILMS FROM POLY (N-ISOPRPYLACRYLAMIDE-CO-VANILLIN ACRYLATE-CO- MALIMIDE): SYNTHESIS, CHARACTERIZATIONS AND SPR- OW FOR SWELLING PROPERTIES

Momen S A Abdelaty
Al Azhar University, Egypt

In recent study we established hydrogel bilayers with non-responsive and functional dual responsive thin films. Here, we will discuss a new strategy of hydrogel bilayers thin films depending on thermo- responsive and functional Thermo-pH dual responsive layers. Vanillin acrylate (VA) monomer has been synthetized and evaluated in one step reaction. Environmental functional photo-cross-linker polymers were synthetized by the copolymerization of N-isoprpylacrylamide, (5, 10 and 15 mole %) (VA) and (2, 5 and 10 mole %) photo-cross-linkers. Otherwise, three different mole ratios (2, 5 and 10 mol %) of thermo- responsive photo-cross-linkers polymers were prepared by copolymerization of (NIPAAm) and (DIMAAm). Polymers were characterized by 1HNMR, FTIR, UV, gel permeation chromatography (GPC) and differential scanning calorimetery (DSC). Lower critical solution temperatures (Tc) were determined by UV.vis.Spectroscopy and micro-DSC. Hydrogel bilayer was formed by spin coating of polymer solution of poly (N-isopropylacryamide-Co-malimide) layer A over gold with adhesion promoter, and then cross-linked by UV- irradiation. The next layer was formed by spin coating of polymer solution poly (N-isopropylacryamide-Co-malimide-Co-VA) layer B over layer A, and then cross-linked by UV-irradiation. The swelling properties and Tc were determined by SPR/OW. The study aims to establish biosensor hydrogel thin films through the active aldehyde group used for immobilization of biological molecules with amino group e.g. amino acids, proteins, DNA and RNA. The responsive-responsive bilayer have a highly sensitivity than one sensitive layer the gel vessel can easily release the target molecule by changing the surrounding environment.

Recent Publications

1. Abdelaty MSA, Environmental Functional Photo-Cross-Linked Hydrogel Bilayer Thin Films from Vanillin. J Polym Environ 3:1- 14 (2017). doi.org/10.1007/s10924-017-1126-y
2. Abdelaty MSA, Preparation and Characterization of New Environmental Functional Polymers Based on Vanillin and Nisopropylacrylamide for Post Polymerization. J Polym Environ 3:1-11 (2017). doi.org/10.1007/s10924-017-0960-2
3. Abdelaty MSA and Kuckling D Synthesis and Characterization of New Functional Photo-Cross-Linkable Smart Polymers Containing Vanillin Derivatives. Gels 2:1-13 (2016).
4. Young-Jin K and Yukiko T. M Thermo-responsive polymers and their application as smart biomaterials. J. Mater. Chem. B 5, 4307-4321 (2017). DOI:10.1039/C7TB00157F
5. Deshmukh PK, Ramani KP, Singh SS, Tekade AR, Chatap VKPatil, GB, and Bari SB. Stimuli-sensitive layer-by-layer (LbL) self-assembly systems: targeting and biosensory applications. J. Control. Release, 166: 294-306 (2013). doi: 10.1016/j.jconrel.2012.12.033

Biography

Momen S.A. Abdelaty is Assistant Professor at Chemistry department, Faculty of Science, Al-Azhar University. He has finished his bachelor in general chemistry at Al-Azhar University. Mater thesis in polymer chemistry has been finished at Chemistry department, Faculty of Science, Al- Azhar University. He has granted PhD scholarship in University of Paderborn Germany from 2008-2012 with the group of Professor Dr. Dirk Kuckling. The project title was photo-cross-linked polymers and hydrogel thin film. After that he has followed postdoc scholarship with the same group. Till now he is working as Assistant Professor in polymer chemistry at Chemistry department, Faculty of Science, Al-Azhar University.

abdelatymomen@yahoo.com

EuroSciCon

ACCEPTED

Abstracts

4th Edition of International Conference on

Polymer Science and Technology

June 04-05, 2018 | London, UK

EuroSciCon

4th Edition of International Conference on
Polymer Science and Technology

June 04-05, 2018
London, UK

Polym Sci 2018, Volume 4
DOI: 10.4172/2471-9935-C2-012

PREDOMINANT INTERACTIONS BETWEEN DISPERSED CARBON NANOTUBES AND HYDROPHOBIC ALLY FUNCTIONALIZED POLYSACCHARIDE IN WATER

Skender A[1], Hadj Ziane A[2] and **Flahaut E[3]**
[1]University Yahia Fares Medea, Algeria
[2]University Saad Dahlab Blida, Algeria
[3]CIRIMAT, France

Achieving stable suspensions of carbon nanotubes (CNTs) is still a challenge; pristine CNTs have limited solubility in either organic solvents or water due to their hydrophobicity and strong inter tube van der Waals forces. Thus, a lot of efforts have been devoted over the years to prepare stable dispersion. Therefore, a non-covalent approach has the advantage of no disruption of the structure and the properties of the native tubes, which is realized by adding surfactants as it allows keeping intact the intrinsic properties of the CNTs. However, for different applications, the potential toxicity of the surfactant is an important issue. Polysaccharides are among the best candidates and chemical modification can improve their intrinsic features. Therefore, bioengineering technology has likewise become increasingly sophisticated with the result using numerous chemical derivatives of commercial polysaccharides and many of the untreated polymers themselves, showing remarkable and sometimes unique properties as thickening, stabilizing, gelling, and emulsifying agents. Hence, among the family of water-soluble polysaccharide the xanthan gum, the physical properties of this polysaccharide are correspondingly subject to less than normal variations and certain bacterial polysaccharides, chemical modification can change the character of the polysaccharide yielding therefore, to a new properties. The dispersion and the stability against sedimentation of double walled carbon nanotubes (DWCNTs) have been investigated (rheological properties, Zeta potential) as a function of pH and Xan concentration. Our results show that stable suspension of DWCNTs with functionalized xanthan gum could be obtained.

skender_ab@yahoo.com

EuroSciCon

4th Edition of International Conference on
Polymer Science and Technology

June 04-05, 2018
London, UK

Polym Sci 2018, Volume 4
DOI: 10.4172/2471-9935-C2-012

SENSING HUMAN PULSE-RATE USING IONIC POLYMER METAL COMPOSITE (IPMC)

Debabrata Chatterjee
Indian Institute of Engineering Science and Technology, Shibpur, India

The interest in Bio-Inspired Engineering is triggered by innovations "inspired by nature", but imaginative by necessity. In pursuance of such activities several new kind of materials have evolved, which are having several functions in itself as a sensor and actuator. Moreover, their capabilities and applications are further augmented by bio-inspired technologies, which is expected to bring about completely different ways people and machines interact with the physical world. In this context use of Ionic Polymer-Metal Composites (IPMCs) appears to be attractive for its: facile fabrication, high mechanical flexibility, light weight, customizable electromechanical coupling properties and tailorable geometries. An IPMC consists of a polyelectrolyte membrane containing ions with a solvent and metal electrodes plated on both surfaces of the membrane. Development of smart material using ionic polymer-metal composites (IPMCs) is of abiding importance. The IPMCs are now recognized to have potential applications in developing bio-mimetic sensors, actuators, transducers, and artificial muscles. We have been engaged in developing IPMC based actuators and sensors. Recently we have reported results of the actuation and sensing studies of a five-fingered miniaturized robotic hand fabricated by using IPMC. Very recently, we have explored the possibility of using Nafion based IPMC as a soft wearable sensor for human pulse-rate extraction. In this talk the concept of a novel pulse rate sensing device is introduced exhibiting the proof-of-principle of the mechano-electrical functions of the device, namely IPMC film prepared by surface platinization of the ionic-polymer film. Such work stimulates further research towards development technologies that have far reaching application consequences in biomedical engineering.

dchat57@hotmail.com

EuroSciCon

4th Edition of International Conference on
Polymer Science and Technology

June 04-05, 2018
London, UK

Polym Sci 2018, Volume 4
DOI: 10.4172/2471-9935-C2-012

INTEGRATION OF INDUSTRIAL BY-PRODUCTS INTO BIO-SOURCED RESINS AND COMPOSITES

Erol Dan Licsandru[1], Monika Rymarczyk[2], Aratz Genua[3], David Ponce[4] and **Alice Mija[1]**
[1]Institute of Chemistry of Nice, France
[2]Centexbel, Belgium
[3]Cidetec, Spain
[4]AITIIP Technology Center, Spain

The RECYSITE project aims to develop bio-sourced composite materials based on vegetal fibers and resins based on humins and epoxidized linseed oil (ELO). In turn these materials will be used as parts in the transportation and constructions sectors. Humins are a by-product of bio-refineries in the production of furan-based monomers. As a by-product, they can represent as much as 30% w/w in the industrial process. From a chemical standpoint they are complex mixtures of furan derivatives, in various degrees of polymerization. This aspect offers perspectives towards higher value applications such as polymers. ELO is an epoxidized vegetable oil containing 5.5 oxirane moieties per molecule. It is regarded as a bio-sourced, renewable alternative to classical, synthetic epoxides. Resins were produced from humins, ELO and Capcure 3-800 and characterized through ATR (Attenuated total reflection) FT-IR (Fourier transform infrared spectroscopy). Based on formulation, a wide array of materials was obtained with shore hardness varying from 56A to 66D. The thermal behavior of the resins was evaluated through differential scanning calorimetry and thermogravimetric analysis. Composites, employing as reinforcement, five types of vegetal fibers were obtained. The adherence of the resin to the reinforcement was evaluated through scanning electron microscopy (SEM) and was found to be optimal. Figure 1 displays the results of the project. The obtained composites present a bio-based content up to 85%. The mechanical properties of the materials can be adjusted by adapting the formulation. The good compatibility between the resin and the reinforcement proposes the materials as candidates to replace classical materials in applications. At this moment, the materials are tested as parts for the transportation and constructions sectors.

erol-dan.licsandru@unice.fr

EuroSciCon

4th Edition of International Conference on
Polymer Science and Technology

June 04-05, 2018
London, UK

Polym Sci 2018, Volume 4
DOI: 10.4172/2471-9935-C2-012

SPIROCYCLIC N-ALKOXYAMINES WITH-HYDROGEN AS INITIATORS IN NITROXIDE MEDIATED POLYMERIZATION (NMP) OF STYRENE

Juan S Pardo Tamayo, Alejandro Guerrero Caicedo and **Hector F Zuluaga and Luz M Jaramillo Gómez**
University of Valle, Colombia

In this work, new spyrocyiclic N-alkoxyamines 1 leading to initiators for controlled polymerization were synthesized. These compounds constituted by an indene system connected through a carbon atom to a pyrrolidine nucleus, and containing an alpha H to the N atom, are able to generate the corresponding nitroxides 2. The cleavage temperatures were determined by ESR spectroscopy. In order to evaluate the effectiveness of the initiators, styrene 3 polymerizations were carried out In general, it was observed that at higher temperatures the conversion percentage increased, and both the dispersity index and polymer molecular weight decreased, suggesting that the reaction mechanism proceeds similar to that expected for a nitroxide-mediated polymerization (NMP).

hector.zuluaga@correounivalle.edu..co

EuroSciCon

4th Edition of International Conference on
Polymer Science and Technology

June 04-05, 2018
London, UK

Polym Sci 2018, Volume 4
DOI: 10.4172/2471-9935-C2-012

COMPOSITE ION EXCHANGE MATERIALS FOR WATER PROCESSING

Maghchiche Abdelhak
University of Batna, Algeria

Insoluble resins offer several advantages in preparation processes, the chemical, photochemical and thermal mechanical properties of composites are largely affected by matrix properties. The known ion exchange composites are natural or synthetic mineral "zeolites", others are organic "ion exchange resins". The scientific study of the latter has undergone a colossal development; but remain to be promoted for their applications in the field of water treatment. The goal of the work is gaining access to a unique multifunctional process for fine and hyperfine separations. The composite material prepared from an inert support on which oligomers with a polystyrene sulfonated ion exchange capacity (PSS) are adsorbed and incorporated into its structure. In this way, the suspensoids and salts dissolved in the water will be filtered and separated. To characterize these composites, some tests were made like crystallinity rate, IR, thermal analysis, morphological structure and absorbent properties. The proposed new composites were of high capacity, wide applicability, wide versatility and low cost.

amaghchiche@yahoo.fr

EuroSciCon

4th Edition of International Conference on
Polymer Science and Technology

June 04-05, 2018
London, UK

Polym Sci 2018, Volume 4
DOI: 10.4172/2471-9935-C2-012

PLURONIC F-127 AND CHITOSAN HYDROGEL DELIVERING NITRIC OXIDE WITH ANTIBACTERIAL EFFECT AND CYTOCOMPATIBILITY

Milena T Pelegrino[1], Bruna de Araujo Lima[2], Mônica H M do Nascimento[1], Christiane B Lombello[1], Marcelo Brocchi[2] and **Amedea B Seabra[1]**

[1]UFABC, Brazil
[2]UNICAMP, Brazil

Nitric oxide (NO) is a small molecule involved in a wide range of physiological and pathophysiological processes, including vasodilatation, control of inflammatory pain, wound healing, and antibacterial activities. As NO is a free radical, the design of drugs that generates therapeutic amounts of NO in controlled spatial and time manners is still a challenge. In this study, the NO donor S-nitrosoglutathione (GSNO) was incorporated into the thermoresponsive pluronic F-127 (PL) - chitosan (CS) hydrogel, in an easy and economically feasible methodology. CS is a polysaccharide with known antimicrobial and biocompatibility properties. Scanning electron microscopy, rheology and differential scanning calorimetry techniques were used for hydrogel characterization. The results demonstrated that the hydrogel has a smooth surface, thermoresponsive behavior, and good mechanical stability. The kinetics of NO release and GSNO diffusion from GSNO-containing PL/CS hydrogel demonstrated a sustained NO/GSNO release, in concentrations suitable for biomedical applications, at physiological and skin temperatures. The GSNO-PL/CS hydrogel demonstrated a concentration-dependent toxicity to Vero cells and antimicrobial activity to Pseudomonas aeruginosa (minimum inhibitory concentration and minimum bactericidal concentration values of 0.5 µg•mL-1 of hydrogel, which correspondents to 1 mmol•L-1 of GSNO). Interestingly, the concentration range in which the NO-releasing hydrogel demonstrated antibacterial effect was not found toxic to Vero mammalian cell. Thus, GSNO-PL/CS hydrogel is suitable biomaterial for topical NO delivery applications.

pelegrino.milena@ufabc.edu.br
pelegrino.milena@gmail.com

EuroSciCon

4th Edition of International Conference on
Polymer Science and Technology

June 04-05, 2018
London, UK

Polym Sci 2018, Volume 4
DOI: 10.4172/2471-9935-C2-012

NEW DRUG-LOADED PHOSPHORUS DENDRIMERS: SYNTHESIS, CHARACTERIZATION AND BIOLOGICAL EVALUATION

Nabil El Brahmi
Euromed University of Fes, Morocco

Dendrimers are monodisperse nanosized polymeric molecules composed of a large number of perfectly branched monomers. The versatile chemical composition of dendrimers strongly offers a variety of applications in different areas such as for instance: chemistry, catalysis, and medicine. Currently, the potential of using dendrimers as nano-carriers for drug delivery is revolutionizing medicine by improving the efficiency and reducing the toxicity of various treatments. Dendrimers can form either covalent or non-covalent (encapsulation) bonds with bioactive molecules. In the case of covalent bond, drug can be directly attached to dendrimer or via a linker – cleavable or not - and the resulting drug-loaded dendrimer can act as a nano-vehicle for drug transport and controlled release. We will present the synthesis and characterization of original functionalized phosphorus dendrimers (generations G1 to G3) containing various functional groups on their peripheries such as arene-copper (II) and ethacrynic acid moieties. Also, we will report the studies of the very interesting cytotoxicity activities against different solid and liquid cancer cell lines of these new dendrimers.

n.elbrahmi@ueuromed.org

EuroSciCon

4th Edition of International Conference on
Polymer Science and Technology

June 04-05, 2018
London, UK

Polym Sci 2018, Volume 4
DOI: 10.4172/2471-9935-C2-012

BIO-BASED POLY (BUTYLENE SUCCINATE) FOAMING BY MICROCELLULAR INJECTION-MOLDING: EFFECT OF N2 SOLUBILITY ON CELL MORPHOLOGY

Nazim Ykhlef[1] and **Eric Lafranche**[2]
[1]IMT Lille Douai, France
[2]Universite de Lille, Lille, France

Polymer foams, especially those based on biodegradable polymers, are in high demand because they remain the best solution to durably reduce the environmental footprint. During the foaming process of polymers, the gas dissolution is one of the key physicochemical parameter that determines the foam quality. In this work, the effect of nitrogen dissolution in a bio-based polybutylene succinate (PBS) foamed by microcellular injection molding has been investigated. Low molecular weight PBS (LM-PBS) was melt-blended as additives to linear PBS (L-PBS) and branched PBS (B-PBS). LM-PBS was first produced by a hydrolysis reaction of a commercial PBS at 80°C (with kinetic monitoring of the molecular weight) prior melt-blending by twin-screw extrusion into commercial PBS. Foam morphologies were subsequently characterized by scanning electron microscopy coupled to image analysis and the effect of the LM-PBS on rheological properties has been also identified in order to establish correlations between cell morphology (size and density) and shear/elongational viscosities. Interestingly, our results showed smaller cell size and higher cell density for the blends containing the LM-PBS. Lower viscosities are observed and our trends are in apparent contradiction with classical results in field of polymer foaming. In conclusion, better cell structure can be achieved despite lower viscosities. The impact of N2 solubility on cell nucleation is finally discussed based on various experiments. The as-developed approach consequently represents an elegant way to tune and optimize foam morphologies by microcellular injection molding.

nazim.ykhlef@imt-lille-douai.fr

EuroSciCon

4th Edition of International Conference on
Polymer Science and Technology

June 04-05, 2018
London, UK

Polym Sci 2018, Volume 4
DOI: 10.4172/2471-9935-C2-012

AN UNEXPLORED REMARKABLE POLY(N-ISOPROPYLACRYLAMIDE)-OSMOLYTE INTERACTION STUDY

Payal Narang and Pannuru Venkatesu
University of Delhi, India

We investigate the aggregation and hydrophobic collapse of water soluble amphiphilic polymer, poly(N-isopropylacrylamide) (PNIPAM), in aqueous solution containing various additives such as trehalose, sucrose, sorbitol, urea, TMAO (Trimethylamine N-oxide) and their mixtures in varying ratios. The effect of these osmolytes on the coil to globular transition of the PNIPAM is studied by the use of comprehensive biophysical techniques like UV-visible and fluorescence spectroscopy, dynamic light scattering (DLS) and Fourier transform infrared spectroscopy (FTIR). The polarization induced by these additives makes the collapse of PNIPAM much faster as compared to PNIPAM in aqueous solution. The decrease in lower critical solution temperature (LCST) of the polymer with increase in the concentration of osmolyte is due to the significant changes in the interactions among polymer, osmolyte and water. The driving force for concomitant sharp configurational transition has been attributed to rupture of hydrogen bonds between water and polymer and to hydrophobic association of polymer. The results of the present study can be used in the bioresponsive smart PNIPAM-based devices. This tuning of LCST may help in various scientific areas to explore target specific applications of intelligent PNIPAM. The modified collapsed state in PNIPAM may provide sites for efficient drug encapsulation and their controlled release.

narangpayal1992@gmail.com

EuroSciCon

4th Edition of International Conference on
Polymer Science and Technology

June 04-05, 2018
London, UK

Polym Sci 2018, Volume 4
DOI: 10.4172/2471-9935-C2-012

A STUDY OF THE FLOW BEHAVIOUR OF NATURAL RUBBER LATEX/ SINGLEWALLED CARBON NANOTUBES BLENDS USING ROTATIONAL VISCOMETRY AND POWER LAW MODEL

Victor Chike Agbakoba and **Percy Hlangothi**
Nelson Mandela University, South Africa

The physiochemical modification of natural rubber latex (NRL) is achieved via the addition of finely dispersed reinforcing fillers (RFs) and chemical ingredients. In recent times, single walled carbon nanotubes (SWCNT) have shown great prospect as a suitable RF for NRL even at very low loadings; compared to conventional RFs such as carbon black and fine particle clays. Although SWCNT are generally insoluble in water, optimized dispersions are often prepared via various physiochemical treatments which promotes the exfoliation of the otherwise entangled SWCNT. Chemical modification (covalent methods) involves the introduction of functional groups on the surfaces of SWCNT. Whereas, physical treatment (non-covalent methods) often utilise surfactant systems with a relatively high Hydrophilic-lipophilic balance (HLB). It is thus pertinent to elucidate how the incorporation of dispersed SWCNT affects the flow behaviour of NRL. This is because, the flow behaviour of NRL plays a huge role during storage, handling and processing. In this work, the flow behaviour of NRL/SWCNT blends prepared via the latex stage mix method have been investigated. Flow behaviour was studied according to the principles of rotational viscometry on a Modular Compact Rheometer (MCR) fitted with a concentric cylinder geometric measuring system. The experimental conditions involved the exposure of blends to varying shear rates (0.1 –100 s-1) at three isothermal temperatures (25, 30 and 35°C); this was based on the probable conditions during storage, handling and processing of rubber lattices. Results obtained revealed high apparent viscosity at low shear rates for samples with higher loadings of SWCNTs. For Instance, viscosity at 25°C and 1 s-1 of blends with 0.08% SWCNT was 2.5 Pa.s whilst that with 0.02% loading 0.49 Pa.s. Again, characteristic shear thinning behaviour was observed, which was confirmed by the power law model fits.

s215161440@mandela.ac.za
vic.dave@yahoo.com

EuroSciCon

4th Edition of International Conference on
Polymer Science and Technology

June 04-05, 2018
London, UK

Polym Sci 2018, Volume 4
DOI: 10.4172/2471-9935-C2-012

CURIOUS ASSOCIATIVE/DYNAMIC PROPERTIES OF PERFLUOROCARBON MODIFIED VINYL POLYMERS IN SOLUTIONS, BLENDS AND IN THE SOLID STATE

Thieo Hogen Esch
University of Southern California, USA

Perfluorocarbon (RF) groups attached as pendent groups to aqueous polymers (polyacrylamide and similar polymers) via spacer groups of various lengths have shown extraordinary hydrophobicity compared with hydrocarbon groups of similar lengths as shown by NMR, and rheology studies. Large RF mediated increases in polymer association especially for longer spacer groups were observed for a wide range of these polymers. In addition, blends of well-defined C_4F_9, C_7F_{15}, $C_{10}F_{21}$ and $C_{13}F_{27}$ end-functionalized polystyrene (RF-PS) and poly(n-butylmethacrylate) prepared by ATRP using RF–tagged initiators. Blends of these polymers have been studied by DSC, AFM, TEM and optical transmittance. The AFM micrographs show crater, necklace and other RF mediated morphologies indicating he presence of submicron RF micelles that mediate blending. More recently RF-PS polystyrenes end-functionalized with longer perfluoroalkyl (RF=C_7F_{15}, $C_{10}F_{21}$, $C_{13}F_{27}$) groups were studied using DSC, nano-indentation and other properties These showed pronounced increases in storage and especially loss moduli compared with polystyrene polymers having the same molecular weights hence indicating an important role especially of the $C_{13}F_{27}$ groups in both increasing both storage and mechanical loss moduli. The RF groups appear to be present as micelles. Interestingly, compared with the matching PS, the glass transition temperatures of the $C_{13}F_{27}$-PS polymers were found to decrease by as much as 15°C being seen for longer RF groups consistent with rapid dynamics in the $C_{13}F_{27}$ micelles below 100°C.

hogenesc@usc.edu

EuroSciCon

4th Edition of International Conference on
Polymer Science and Technology

June 04-05, 2018
London, UK

Polym Sci 2018, Volume 4
DOI: 10.4172/2471-9935-C2-012

A NEW CLASS OF CAFFEIC ACID-DERIVED BIOPOLYETHER FROM MEDICINAL PLANTS ITS SYNTHETIC BASIC MONOMERIC MOIETY AND THEIR ANTICANCER EFFICACY

V Barbakadze[1,2]

[1]Tbilisi State Medical University, Georgia

[2]I G Kutateladze Institute of Pharmacochemistry, Georgia

Within the field of pharmacologically active biopolymers the area of stable polyethers seems rather attractive. The high-molecular fractions from the several species of two genera Symphytum and Anchusa were isolated by ultrafiltration of water-soluble crude polysaccharides on the membrane filter with cut-off value of 1000 kDa. According to IR, 13C and 1H NMR, 1D NOE, 2D heteronuclear 1H/13C HSQC and 2D DOSY experiments the main structural element of these preparations was found to be a new regular polymeric molecule. The polyoxyethylene chain is the backbone of this biopolymer. 3,4-Dihydroxyphenyl and carboxyl groups are regular substituents at two carbon atoms in the chain. The repeating unit of this regular caffeic acid-derived polyether, is 3-(3,4-dihydroxyphenyl)glyceric acid residue. Thus, the structure of natural polymer under study was found to be poly[oxy-1-carboxy-2-(3,4-dihydroxyphenyl)ethylene] or poly[3-(3,4-dihydroxyphenyl)glyceric acid] (PDPGA). Such caffeic acid-derived biopolymer to our knowledge has not been known and has been identified for the first time. This compound represents a new class of natural polyethers. Then the racemic monomer and its pure enantiomers (+)-(2R,3S)-2,3-dihydroxy-3-(3,4-dihydroxy-phenyl)-propionic acid [(2R,3S)-DDPPA] and (-)-(2S,3R)-2,3-dihydroxy-3-(3,4-dihydroxy-phenyl) propionic acid [(2S,3R)-DDPPA] were synthesized for the first time via sharpless asymmetric dihydroxylation of trans-caffeic acid derivatives using an osmium catalyst and (DHQ)2-PHAL and (DHQD)2-PHAL as chiral auxiliaries. PDPGA is endowed with intriguing pharmacological activities as anticomplementary, antioxidant, anti-inflammatory, burn and wound healing and anticancer properties. PDPGA and its synthetic monomer exerted anticancer activity in vitro and in vivo against androgen-dependent and -independent human prostate cancer (PCA) cells via targeting androgen receptor, cell cycle arrest and apoptosis without any toxicity, together with a strong decrease in prostate specific antigen level in plasma. However, our results showed that anticancer efficacy of PDPGA is more effective compared to its synthetic monomer. Overall, this study identifies PDPGA as a potent agent against PCA without any toxicity and supports its clinical application.

v_barbakadze@hotmail.com

EuroSciCon

4th Edition of International Conference on
Polymer Science and Technology

June 04-05, 2018
London, UK

Polym Sci 2018, Volume 4
DOI: 10.4172/2471-9935-C2-012

TANNIC ACID REDUCED GO AND ELECTROCHEMICAL PROPERTIES OF PANI/TA-RGO COMPOSITE

Xueyan Zhao and **Jürgen Pionteck**
Leibniz Institute of Polymer Research, Germany

Supercapacitor, which can be divided into electrochemical double layer supercapacitor (EDLC) and pseudocapacitor, is an attractive environment-friendly energy supplier. And composition is a promising way to combine the high power density of carbon-based EDLC and high energy density of pseudocapacitors based on conductive polymers or transition metal oxidant. Among the composites for the use of supercapacitor electrode, reduced graphite oxide-based polyaniline composite (PANI/rGO) is cost-efficient, easy to synthesize and suitable for large-scale manufacture. However, there are two main obstacles for the development of PANI/rGO composite. Firstly, commonly used reducers, such as hydrazine hydrate (HH) and sodium borohydride, are toxic. Secondly, rGO tend to restack after reduction, resulting in a non-uniform dispersion inside the PANI. In this study, we used an environment friendly tannic acid (TA) as reducer, and the electrochemical properties of PANI/TA-rGO composites were investigated. Additionally, TA is expected to interact with rGO and develop the dispersion of rGO, therefore additionally surface modification or addition of dispersant can be avoided. X-ray diffraction and Raman spectra indicate that, the reducing efficiency of TA could be enhanced by extending the reduction time. Compared with HH, TA presents a less reducing efficiency, but the rGO-TA shows better dispersion in the water than the rGO-HH. Therefore, the PANI/rGO-TA composites own much higher specific surface area and higher rate capability than the PANI/rGO-HH composite. The specific capacitance of PANI/rGO composite relies not only on the specific surface area, but also on the conductivity. PANI/rGO-TA-24h, in which the rGO was prepared by using TA as reduced for 24 h, shows the highest specific capacitance in this study. Moreover, the morphology of PANI could be influenced by the surface functionality of rGO.

zhao-xueyan@ipfdd.de