

新型高分子产品及其成型方法 New Polymeric Products and Its Processing

Methods

● 教师介绍 Faculty



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Research Field: spinning of special functional fibers, preparation of nanofibers by electrospinning, preparation of membrane for fuel cell, medical application and preparation of nanocomposites, etc.

Work Experience:

- Jul 2012-now, Faculty, College of Materials Science and Engineering, BUCT, China
- Jul 2011-Jul 2012, Visiting Associate Professor, School of Applied Engineering & Physics, Cornell University, USA
- Oct 2007- Jul 2011, Faculty, College of Mechanical & Electrical Engineering, BUCT, China
- Jul 2005- Sep 2007, Post Doctor, Department of Chemical Engineering, Tsinghua University, China
- Jul 1996- Aug 1999, Engineer, Qingdao Yellow Sea Rubber Company Limited, China

Education:

Ph. D., Institute of Chemistry, Chinese Academy of Sciences, Sep 2002- Jul 2005

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Brief Introduction: Yong Liu, Associate Professor, advisor for PhD and Master students, Director of the lab of polymeric nano composite. His researches mainly focus on preparation and application of polymer and its nanocomposites (<https://scholar.google.com/citations?hl=en&user=1jDvjfgAAAAJ>). His research fields include the application of high performance engineering plastics, performance advancement of the rubber products, recipes design and processing development of plastic products, spinning of special functional fibers, preparation of nanofibers by electrospinning, decomposing formaldehyde at

dark and room temperature, preparation of membrane for fuel cell, application and preparation of nanoparticles, etc. He has published 101 articles in peer-reviewed journals, and given 47 oral presentations / poster in national and international conferences. Prof. Liu applied 83 patents and 47 have been issued. He was often invited to review manuscripts for journals such as Polymer, RSC Advances, Polymer Engineering & Science, Journal of Applied Polymer and Science. Dr. Liu is member of Royal Society of Chemistry, senior member of Chinese Society for Composite Materials, member of American Chemical Society, and member of Chinese Chemical Society.

Representative Publications

1. Han Ding, Xiang Zhang, **Yong Liu***, Seeram Ramakrishna, Review of mechanisms and deformation behaviors in 4D Printing, *The International Journal of Advanced Manufacturing Technology*, 2019, in press, DOI: 10.1007/s00170-019-03871-3
2. Alexey Iordanskii*, Svetlana Karpova, Anatoliy Olkhov, Pavel Borovikov, Natalia Kildeeva, **Yong Liu**, Structure-Morphology Impact upon Segmental Dynamics and Diffusion in the Biodegradable Ultrafine Fibers of Polyhydroxybutyrate-Polylactide blends, *European Polymer Journal*, 2019, 117, 208-216. doi: <https://doi.org/10.1016/j.eurpolymj.2019.05.012>
3. Yulong Xu, Ningxiao Gao, Yueying Gong, Shaosen Huo, Mohamedazeem M. Mohideen, Song Hong, **Yong Liu***, Controllable preparation of methyltriethoxysilane xerogel nanofibers, *Journal of Materials Science*, 2019, 54(14): 10130–10140 DOI: 10.1007/s10853-019-03629-y SCI 2.993
4. Kaili Li, Yulong Xu, **Yong Liu***, Mohamedazeem M. Mohideen, Haifeng He, Seeram Ramakrishna, Dissipative particle dynamics simulations of centrifugal melt electrospinning, *Journal of Materials Science*, 2019, 54(13), 9958–9968 DOI: 10.1007/s10853-019-03603-8 SCI 2.993
5. Yulong Xu, Kaili Li, **Yong Liu***, Yan An, Changmin Xing, Black plaster composite fiber prepared by upward electrospinning, *Journal of Applied Polymer Science*, 2019, 136(24), 47662 DOI: 10.1002/app.47662
6. Libing Huang, Yulong Xu, Kuan Cao, Ping Hu, Hongtao Wang, Huan Zhang, **Yong Liu***, Preparation of Ultrafine Fibers Containing Chinese Herbal Centipede Ingredients, *China Textile Leader*, 2019, (1): 63-66.
7. Libing Huang, Kuan Cao, Ping Hu, **Yong Liu***, Orthogonal experimental preparation of Sanguis Draconis-Polyvinylpyrrolidone microfibers by electrospinning, *Journal of Biomaterials Science: Polymer Edition*, 2019, Published online: 09 Feb 2019. <https://doi.org/10.1080/09205063.2019.1570432>
8. Liansheng Ma, Jingxin Kang, **Yong Liu***, Haifeng He, Economical and highly efficient Pt-free counter electrode for dye-sensitized solar cells, *Colloids and Surfaces A: Physicochemical and Engineering Aspects*, 2019, Available online 4 January 2019, 10.1016/j.colsurfa.2019.01.010 SCI 2.829
9. GAO Ningxiao, XU Yulong, **LIU Yong***, Preparation of carbon dots from soy milk powder and fluorescent nanofibers containing carbon dots, *CHEMICAL JOURNAL OF CHINESE UNIVERSITIES*, 2019, DOI:10.7503/cjcu20180638
10. **YONG Liu**, HAN Ding, DECHUN Si, LE Zhu, JIE Peng, JIANBO Zhang*, A Review of Proton Exchange Membrane Fuel Cell Catalyst Layer by Electrospinning, *Journal of Electrochemistry*, 2018, 24(0), DOI: 10.13208/j.electrochem.180849
11. Ningxiao Gao, Jing Wu, **Yong Liu***, Preparation of a Dissolved Collagen Peptide - Silk Fibroin Composite

- Fiber Mask by Electrospinning, *Journal of Beijing University of Chemical Technology(Natural Science Edition)*, 2018, 45(6): 21-28. Doi: 10.13543/J.bhxbzr.2018.06.004
12. **Y. Liu**, K. Cao, S. Karpova, A. Olkhov, A. Filatova, A. Zhulkina, A. Burkov, S. V. Fomin, D.S. Rosa, A.L. Iordanskii, Comparative characterization of melt electrospun fibers and films based on PLA-PHB blends: Diffusion, drug release and structural features, *Macromolecular Symposia*, 2018, 381, 1800130. DOI: 10.1002/masy.201800130
 13. D. Si, S. Zhang, J. Huang, C. Wang, **Y. Liu***, J. Zhang*, Electrochemical Characterization of Pre-conditioning Process of Electrospun Nanofiber Electrodes in Polymer Electrolyte Fuel Cells, *Fuel Cells*, 2018, DOI: 10.1002/fuce.201700209
 14. Huichao Liu, Jingxin Kang, **Yong Liu***, Micron poly-L-lactide fibers fabricated by melt direct writing, 2018 7th International Conference on Energy, Environment and Sustainable Development (ICEESD 2018), DOI: 10.2991/iceesd-18.2018.4 (EI)
 15. Huichao Liu, Shayanti Mukherjee, **Yong Liu***, Seeram Ramakrishna, Recent studies on electrospinning preparation of patterned, core-shell, and aligned scaffolds, *Journal of Applied Polymer Science*, 2018, 135, 46570 DOI: 10.1002/app.46570
 16. Shaopeng Zhang, Dan Li, Jingxin Kang, Guiping Ma, **Yong Liu***, Electrospinning preparation of a graphene oxide nanohybrid proton-exchange membrane for fuel cells, *Journal of Applied Polymer Science*, 2018, 135, 46443 DOI: 10.1002/app.46443
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 18. K. Cao, **Y. Liu***, A.A. Olkhov, V. Siracusa, A.L. Iordanskii, PLLA-PHB Fiber Membranes Obtained by Solvent-Free Electrospinning for Short-time Drug Delivery, *Drug Delivery and Translational Research*, accepted. 2017, Doi: <https://doi.org/10.1007/s13346-017-0463-7>
 19. ShaohuaWu, Hao Peng, Xiuhong Li, Philipp N Streubel, **Yong Liu*** and Bin Duan*, Effect of scaffold morphology and cell co-culture on tenogenic differentiation of HADMSC on centrifugal melt electrospun poly (L-lactic acid) fibrous meshes, *Biofabrication* 9 (2017) 044106, <https://doi.org/10.1088/1758-5090/aa8fb8>
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 21. Zhefu Li, Yichun Yuan, Binling Chen, **Yong Liu**, Jun Nie, Guiping Ma*, Photo and thermal cured silicon-containing diethynylbenzene fibers via melt electrospinning with enhanced thermal stability, *Journal of Polymer Science, Part A: Polymer Chemistry*, 2017, 55, 2815 - 2823. DOI: 10.1002/pola.28687
 22. Kuan Cao, **Yong Liu***, Seeram Ramakrishna, Recent Developments in Regenerated Silk Fiber, *Journal of Nanoscience and Nanotechnology*, 2017, 17, 8667-8682. doi:10.1166/jnn.2017.15010
 23. Qingsong Song, Jingnan Zhang, **Yong Liu*** Mesoscale simulation of a melt electrospinning jet in a periodically changing electric field, *Chemical Journal of Chinese Universities*, 2017, 38(6): 966-974. Doi: 10.7503/cjcu20160878
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- **课程介绍 About Course**

- This course will be taught in English. In this course, students will understand and know well the latest polymeric products and its processing methods, they will also need to review a lot of English literatures and writing a English literature review to improve their English proficiency and learned the latest advances in science and technology of their expertise fields. Through course learning, make students understand and master the new engineering plastics and application equipments, New rubber and the processing equipments, high-performance fibers and the molding equipments, nanofibers and the production equipments, medical polymer materials and 3D printers and other basic knowledge. Deepen their understanding of new polymer materials and processing equipments. It is of great benefit to broaden the horizons of the graduate in our academy and cultivate international talents, laying the foundation for the graduate major in materials and mechanical engineering who will engage in polymer materials processing equipments and related fields.

Content and Arrangements:

- 1. Illustrated by the case of self-lubricating plain bearings of submarine, led the students to learn and understand: (6 hours)**

Characteristics and differences between common plastics and engineering plastics

Structural features, performance characteristics, application, processing equipment of Polyoxymethylene

Structural characteristics, development, application, processing equipment of PEEK

Structural and performance characteristics, application, processing equipment of other engineering plastics such as polytetrafluoroethylene, polystyrene resin, polyimide, ultra high

molecular weight polyethylene.

2. Illustrated by the case of seismic construction rubber mats, led the students to learn and understand: (6 hours)

Structural characteristics, performance characteristics, processing method and equipments of ordinary rubber;

Structural features, performance characteristics, processing method and equipments of silicon rubber;

Introduction of other rubber, including urethane rubber, acrylic rubber, polysulfide rubber, epichlorohydrin rubber and the like.

Master the structural characteristics, processing methods and equipment of silicone rubber, fluorine rubber;

3 Illustrated by the case of a weapon with a flexible impact resistant capsule, led the students to learn and understand: (6 hours)

The history, structural features, performance characteristics, processing method and equipments of carbon fiber;

Structure characteristics, performance characteristics, processing method and equipments of aramid fibers;

Structure characteristics, performance characteristics, processing method and equipments of high molecular weight polyethylene fiber.

Learn the history, performance characteristics and production equipment of above fibers.

4. Illustrated by the case of preparation of electrospun nanofibers, led the students to learn and understand: (6 hours)

The origin, development and the basic principles of electrospinning technology; some patents of electrospinning equipment;

Advantages and disadvantages of melt electrospinning, the latest developments and construction equipment.

Learn about nanofibers, the main varieties, preparation device.

5. Illustrated by the case of preparation of artificial ears, led the students to learn and understand: (6 hours)

Basic requirements of Medical polymeric material;

Introduction of artificial heart, artificial kidney, artificial lung, artificial cornea;

Artificial organs and its forming process;

3D printing technology and structural features of the equipment;.

6. Illustrated by the case of a review article, explain the method of writing review, allow students to review English literatures and related patents to write an English review about the research progress of a device or product materials and equipment. (2 hours)

Final score: 10% Daily + 90% Homework

Total score is divided into five sub-system, namely excellent, good, medium, pass and fail;

Actively involving in teaching and learning activities,10 points; Carefully completing and submitting assignment on time, 90 points, then converse the total score into the corresponding five point scale.

- 视频 Video