第 四 季 度 工 作 报 告

（2014.10-2014.12）

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目　　录

高分子物理与化学国家重点实验室（长春）

2015年1月20日

一、研究工作进展

实验室 2014 年四季度在 Acs Appl Mater Inter, Acs Macro Lett, Adv Funct Mater, Appl Phys Lett, Chem Asian J, Chem Commun, Chem Rev, Chem-Eur J, Colloid Surface B, Compos Part A-Appl S, Inorg Chem, Isr J Chem, J Chem Phys, J Mol Catal A-Chem, J Phys Chem B, J Polym Sci Pol Chem, Langmuir, Macromolecules, Nanoscale, Organometallics, Phys Chem Chem Phys, Polym Chem-Uk, Polymer, Rsc Adv, Soft Matter, Toxicol Appl Pharm 等 SCI 收录杂志上发表学术论文 83 篇，其中影响因子大于 3 的 42 篇(实验室为第一单位)。

主要论文

1. Near-infrared emitting fluorescent BODIPY nanovesicles for in vivo molecular imaging and drug delivery
Li Quan, Shi Liu, Tingting Sun, Xingang Guan, Wenhai Lin, Zhigang Xie*, Yubin Huang, Yiqing Wang, Xiabin Jing
Acs Appl Mater Inter, 6(18), 16166-16173, 2014

2. Nuclease-functionalized poly(styrene‑b‑isobutylene‑b‑styrene) surface with anti-infection and tissue integration bifunctions
Shuaishuai Yuan, Jie Zhao, Shifang Luan*, Shunjie Yan, Wanling Zheng, Jinghua Yin*
Acs Appl Mater Inter, 6(20), 18078-18086, 2014

3. Construction of 3D micropatterned surfaces with wormlike and superhydrophilic PEG brushes to detect dysfunctional cells
Jianwen Hou, Qiang Shi*, Wei Ye, Qunfu Fan, Hengchong Shi, Shing-Chung Wong, Xiaodong Xu, Jinghua Yin*
Acs Appl Mater Inter, 6(23), 20868-20879, 2014

4. Molecular weight dependency of surface free energy of native and stabilized crystallites in isotactic polypropylene
Ying Lu, Yaotao Wang, Zhiyong Jiang, Yongfeng Men*
Acs Macro Lett, 3(11), 1101-1105, 2014

5. Optimization of solubility, film morphology and photodetector performance by molecular side-chain engineering of low-bandgap thienothiadiazole-based polymers
Ji Qi, Xiaokang Zhou, Dezhi Yang, Wenqiang Qiao*, Dongge Ma, Zhi Yuan Wang*
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6. Electrical switching and memory behaviors in organic diodes based on polymer blend films treated by ultraviolet ozone
Jinying Huang, Dongge Ma*
Appl Phys Lett, 105(9), 093303, 2014

7. Nanowire shish-kebab structures and molecular orientation control of all-conjugated diblock copolymer
Hua Yang, Lei Wang, Xinhong Yu, Jidong Zhang, Yanhou Geng, Yanchun Han*
Chem Asian J, 9(8), 2239-2248, 2014

8. Supramolecular hydrogels derived from cyclic amino acids and their applications in the synthesis of Pt and Ir nanocrystals
Chuanqing Kang*, Lanlan Wang, Zheng Bian, Haiquan Guo, Xiaoye Ma, Xuepeng Qiu, Lianxun Gao*
Chem Commun, 50(90), 13979-13982, 2014

9. Micropatterning of hydrophilic polyacrylamide brushes to resist cell adhesion but promote protein retention
Jianwen Hou, Qiang Shi*, Wei Ye, Paola Stagnaroc, Jinghua Yin*
Chem Commun, 50(95), 14975-14978, 2014

10. Titanium Dioxide Nanomaterials for Photovoltaic Applications
Yu Bai, Ivan Mora-Sero, Filippo De Angelis, Juan Bisquert, Peng Wang*
Chem Rev, 114(19), 10095-10130, 2014

11. Lutetium-methanediide-alkyl complexes: Synthesis and chemistry
Shihu Li, Meiyan Wang, Bo Liu, Lei Li, Jianhua Cheng, Chunji Wu, Dongtao Liu, Jingyao Liu, Dongmei Cui*
Chem-Eur J, 20(47),15493-15498, 2014

12. Immobilizing PEO–PPO–PEO triblock copolymers on hydrophobic surfaces and its effect on protein and platelet: A combined study using QCM-D and DPI
Jing Jin, Fujian Huang, Yu Hu, Wei Jiang*, Xiangling Ji, Haojun Liang, Jinghua Yin*
Colloid Surface B, 123, 892-899, 2014

13. Synergetic effect of epoxy resin and maleic anhydride grafted polypropylene on improving mechanical properties of polypropylene/short carbon fiber composites
Minggang Li, Xin Wen*, Jie Liu, Tao Tang*
Compos Part A-Appl S, 67(12), 212-220, 2014

14. A Nanosized {Ag@Ag-12} "Molecular Windmill" Templated by Polyoxometalates Anions
Lei Wang, Weiting Yang, Wei Zhu, Xingang Guan, Zhigang Xie*, Zhongming Sun*
Inorg Chem, 53(21), 111584-11588, 2014

15. Orientation and surface activity of janus particles at fluid-fluid interfaces
Huimin Gao, Zhongyuan Lu, Hong Liu, Zhaoyan Sun*, Lijia An
J Chem Phys, 141(3), 134907, 2014

16. Synthesis and characterization of novel chromium complexes based on beta-enaminoketonato ligands and their application to ethylene polymerization
Jingyu Liu, Ping Tang, Yuesheng Li*
J Mol Catal A-Chem, 394,162-169, 2014

17. Crystallization, recrystallization, and melting lines in syndiotactic polypropylene crystallized from quiescent melt and semicrystalline state due to stress-induced localized melting and recrystallization
Ying Lu, Yaotao Wang, Lianlian Fu, Zhiyong Jiang, Yongfeng Men*
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18. Synthesis of novel cyclic olefin polymers with excellent transparency and high glass-transition temperature via gradient copolymerization of bulky cyclic olefin and cis-cyclooctene
Jixing Yang, Jing Cui, Yingyun Long, Yanguo Li, Yuesheng Li*
J Polym Sci Pol Chem, 52(22), 3240-3249, 2014

19. Insights into propylene/omega-halo-alpha-alkenes copolymerization promoted by rac-Et(Ind)(2)ZrCl2 and (pyridyl-amido)hafnium catalysts
Xiaoyan Wang, Yingyun Long, YongxiaWang, Yuesheng Li*
J Polym Sci Pol Chem, 52(23), 3421-3428, 2014

20. Effect of surface interactions on adhesion of electrospun meshes on substrates
Qiang Shi*, Qunfu Fan, Xiaodong Xu, Wei Ye, Jianwen Hou, Shing-Chung Wong, Jinghua Yin*
Langmuir, 30(45), 13549-13555, 2014

21. Facile synthesis of AuPt alloy nanoparticles in polyelectrolyte multilayers with enhanced catalytic activity for reduction of 4‑nitrophenol
Chengcan Chu, Zhaohui Su*
Langmuir, 30(50), 15345−15350, 2014

22. Online rheological investigation on ion-induced micelle transitionfor amphiphilic polystyrene-block-poly(acrylic acid) diblock copolymer in dilute solution
Yuping Sheng, Nan Yan, Yutian Zhu*, Wei Jiang*
Langmuir, 30(51), 15392−15399，2014

23. Cyclopolymerization of si-containing alpha,omega-diolefins by a pyridylamidohafnium catalyst with high cyclization selectivity and stereoselectivity
Bin Wang, Yongxia Wang, Jing Cui, Yingyun Long, Yanguo Li, Xiaoyan Yuan*, Yuesheng Li*
Macromolecules, 47(19), 6627-6634, 2014

24. Direct formation of different crystalline forms in butene-1/ethylene copolymer via manipulating melt temperature
Yaotao Wang, Ying Lu, Jiayi Zhao, Zhiyong Jiang, Yongfeng Men*
Macromolecules, 47(24), 8653-8662, 2014

25. Ultrasonication assisted preparation of carbonaceous nanoparticles modified polyurethane foam with good conductivity and high oil absorption properties
Hengchong Shi, Dean Shi, Ligang Yin, Zhihua Yang, Shifang Luan*, Jiefeng Gao, Junwei Zha, Jinghua Yin, Robert K. Y. Li*
Nanoscale, 6(22), 13748-13753, 2014

26. Copolymerization of epsilon-caprolactone and L-Lactide catalyzed by multinuclear aluminum complexes: An immortal approach
Lei Li, Bo Liu, Dongtao Liu, Chunji Wu, Shihui Li*, Bo Liu*, Dongmei Cui*
Organometallics, 33(22), 6474-6480, 2014

27. Creation of mesopores in carbon nanotubes with improved capacities for lithium ion batteries
Yuan Xu, Jiang Gong, Xuecheng Chen*, Ryszard J, Kalenczuk, Ewa Mijiowska, Wenbin Liu*, Tao Tang*
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28. Achieving balanced intermixed and pure crystalline phases in PDI-based non-fullerene organic solar cells via selective solvent additives
Mingguang Li, Jiangang Liu, Xinxiu Cao, Ke Zhou, Qiaoqiao Zhao, Xinhong Yu, Rubo Xing, Yanchun Han*
Phys Chem Chem Phys, 16(48), 26917-26928, 2014

29. Living syndiospecific polymerization of propylene with sterically encumbered titanium complexes activated by MMAO
Yingyun Long, Yongxia Wang, Baixiang Li, Yanguo Li, Yuesheng Li*
Polym Chem-Uk, 5(22), 6510-6522, 2014

30. Dicyanovinyl-functionalized fluorescent hyperbranched conjugated polymer nanoparticles for sensitive naked-eye cyanide ion detection
Haibo Li, Xiaofu Wu, Yuxiang Xu, Hui Tong, Lixiang Wang*
Polym Chem-Uk, 5(20), 5949-5956, 2014

31. Tunable charge transfer effect in poly-(spirobifluorene)s with different electron-rich side chains
Xuchao Wang, Lei Zhao, Shiyang Shao, Junqiao Ding*, Lixiang Wang*, Xiabin Jing, Fosong Wang
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32. Electric-stimulus-responsive multilayer films based on a cobaltocenium-containing polymer
Jingjing Wei, Lixia Ren , Chuanbing Tang, Zhaohui Su*
Polym Chem-Uk, 5(22), 6480-6488, 2014

33. Dual stimuli- responsive supramolecular hydrogel of bionanoparticles and hyaluronan
Limin Chen, Xia Zhao, Yuan Lin*, Zhaohui Su, Qian Wang*
Polym Chem-Uk, 5(23), 6754-6760, 2014

34. Suzuki-Miyaura catalyst-transfer polycondensation with Pd(IPr)$(OAc)_2$ as the catalyst for the controlled synthesis of polyfluorenes and polythiophenes
Aiguo Sui, Xincui Shi*, Hongkun Tian, Yanhou Geng*, Fosong Wang,
Polym Chem-Uk, 5(24), 7072-7080, 2014

35. Combined effects between activating group Z and leaving group R in dithiocarbamates for controlling degradation and branching reactions of polypropylene
Haiping Xing, Dong Wan, Jian Qiu, Yanhui Wang, Li Ma, Zhiwei Jiang*, Tao Tang*
Polymer, 55(21), 5435-5444, 2014

36. Influence of molecular weight of polymer matrix on the structure and rheological properties of graphene oxide/polydimethylsiloxane composites
Ran Niu, Jiang Gong, Donghua Xu*, Tao Tang, Zhaoyan Sun*
Polymer, 55(21), 5445-5453, 2014

37. Monte Carlo simulation of temperature-induced reversible morphological changes between sphere and vesicle formed by AB diblock copolymers
Juanjuan Fan, Jie Cui*, Yuanyuan Han*, Wei Jiang
Rsc Adv, 4(92), 50351-50360, 2014

38. Cyclic RGD targeting nanoparticles with pH sensitive polymer-drug conjugates for effective treatment of melanoma
Xingang Guan, Xiuli Hu, Shi Liu, Yubin Huang, Zhigang Xie*
Rsc Adv, 4(98), 55187-55194, 2014

39. Flow-induced structure and rheological properties of multiwall carbon nanotube/polydimethylsiloxane composites
Ran Niu, Jiang Gong, Donghua Xu* Tao Tan, Zhaoyan Sun*
Rsc Adv, 4(107), 62759-62768, 2014

40. Effect of polystyrene long branch chains on melt behavior and foaming performance of poly(vinyl chloride)/graphene nanocomposites
Kun Yao, Haiying Tan, Yichao Lin, Guangchun Zhang, Jiang Gong, Jian Qiu, Tao Tang*, Hui Na, Zhiwei Jiang*
Rsc Adv, 4(109), 64053-64060, 2014

41. Synergistic effects of ion pairs on the dielectric properties of diblock copolymer melts
Issei Nakamura*
Soft Matter, 10(48), 9596-9600, 2014

42. Preclinical pharmacology and toxicology study of Ad-hTERT-E1a-Apoptin, a novel dual cancer-specific oncolytic adenovirus
Yanxin Qi, Huanhuan Guo, Ningning Hu, Dongyun He, Shi Zhang, Yunjie Chu, Yubin Huang, Xiao Li*, LiLi Sun*, Ningyi Jin*
Toxicol Appl Pharm, 280(2), 362-369, 2014

二、学术交流

高分子科学系列讲座

➲ **NO. PSLAB194-PS2014-12**

报告题目：Chain conformation and dynamics of polymer under confinements

报 告 人：罗开富 教授

报告人单位：中国科学技术大学高分子科学与工程系

报告时间：2014 年 11 月 12 日 10:00

报告内容：介绍高分子物理中的 Flory 理论、de Gennes 的 Blob 物理图像和标度理论来描述高分子链受限空间的链构象，比较不同拓扑结构的高分子链在受限空间中的链构象。研究高分子链在外场或受限驱动下的输运过程，揭示影响输运动力学的因素，并与实验和模拟结果作对比。

➲ **NO. PSLAB195-PS2014-13**

报告题目：Interaction of Nanomaterials with Lipid Bilayer: Implication from Cytotoxicity to Drug/Gene Delivery

报 告 人：Dr. Benxin Jing

报告人单位：University of Notre Dame，USA

报告时间：2014 年 12 月 11 日（星期一）上午 9:00

报告内容：三种纳米材料如半疏水高分子纳米粒子、极亲水多酸以及表面活性剂型金属-有机纳米簇与磷脂膜的相互作用，期望通过生物物理方法了解它们的细胞毒性在分子尺度上的起源以及药物/基因纳米载体穿透细胞膜的过程，为设计新型低毒纳米材料提供参考。除此之外，希望利用这个机会与应化所的老师们交流多酸/高分子材料的发展现状及未来趋势，寻求合作与工作机会。

➲ **NO. PSLAB 196-PS2014-14**

报告题目：转化效率为 10.8%的单层聚合物太阳能电池中的聚集状态调控

报 告 人：马伟　教授

报告人单位：西安交通大学

报告时间：2014 年 12 月 1 日（星期一）上午 9:00

报告内容：软物质的电子及物理性能通常具有很大的可调节性，这和材料内部的微纳米结构有很大的联系。材料的基本性能和形貌结构之间的复杂相互作用通过一系列测试表征手段来揭示。然而，由于有机材料之间结构类似，对比度较低，而且聚合物通常处于无序或者低序分子排列状态，这使得传统的测试手段(X 射线，中子，电子技术)对这类复杂体系的形貌表测试异常困难。进来发展的软 X 射线散射技术(通过测试每个分子唯一的电子轨道)为揭示有机材料中低序的分子的排列及其中的物理化学基本问题开辟了一条全新的道路。这种测试手段为人们更深层次理解有机太阳能电池中结构和性能的关系提供了强有力的手段。聚合物太阳能电池中的形貌调控是实现高能量转化效率的主要手段。 近来，我们通过热旋涂及转速调控的方法来控制聚合物太阳能电池的微观形貌，使得太阳能能量转化效率突破了 10%大关，达到了 10.8%[1]。我们使用软 / 硬 X 射线散射手段揭示了这些全新调控方法对相区纯度及结晶性能的控制作用，及对有机太阳能电池性能的决定性作用。

[1] Yuhang Liu, Jingbo Zhao,Zhengke Li , Cheng Mu, **Wei Ma***,Huawei Hu, Kui Jiang, Haoran Lin, Harald Ade*, and He Yan*, ***Nature Communication***, *2014, Accepted*

➲ **NO. PSLAB197-PS2014-15**

报告题目：Polymer Brushes: From Thin Film Electronics to 3D Nanopatterning

报 告 人：Dr. Zijian Zheng

报告人单位：香港理工大学纺织及制衣学系

报告时间：2014 年 12 月 26 日（星期五）上午 10:00

报告内容：Polymer brushes are polymer that tenders one end on the surface.

Because of its chemical diversity, mechanical robustness, and high grafting density, polymer brush shows great potentials in a wide variety of applications ranging from electronic fabrications to stem cell researches. This talk will focus on two important issues with polymer brushes. The first part will demonstrate how one can use polymer brushes as a nanoplatform for making high-performance flexible, stretchable, and wearable electronic conductors and devices. The second part will focus on the state-of-the-art development of a nanotechnology, namely "dip-pen nanodisplacement lithography (DNL)", for making 3D polymer structures.