**1. 研究报告题目：**

dynamic molecular networks: from molecular recognition to self-synthesizing materials

**2. 摘要：**

Life is a highly dynamic and complex system containing components such as bilayer membranes, nucleic acids and proteins. These biological macromolecules are not randomly mixed together, but kept in specific compartments, reflecting a high degree of organization. However, the theory behind such well organization of biological organisms is still a mystery for scientists. Learning how to understand much simpler synthetic systems may shed some light on this intriguing issue. Systems chemistry[1] appears justified as it deals with chemical systems endowed with a high degree of complexity, so as to show emergent properties, that is, properties of a whole system that are not predictable solely from the properties of its constituent parts. Dynamic combinatorial chemistry[2] has been proven as a powerful framework for the study of complex chemical systems, for its products form dynamic molecular networks. Our research was extensively focused on self-assembly in complex chemical systems, from thermodynamically[3-5] to kinetically[6,7] controlled systems. We have demonstrated that, in a dynamic molecular network, self-replication could be driven by self-assembly whose outcome is a self-synthesizing material. This discovery reveals that self-assembly not only can construct beautiful and intriguing structures i.e. catenanes[3] and “Russian-doll”-like supramolecular architectures[4], but also can promote the molecules to make copies of themselves as the living matters in nature[6,7]. We have also found that the morphologies of the self-assemblies may be able to decide the occurrence of self-replication.[8] These results have shown the complex interplay between molecular and colloidal aspects of the dynamic systems.

References

(1) Li, J.; Nowak, P.; Otto, S. J. Am. Chem. Soc. 2013, 135, 9596.

(2) Corbett, P. T.; Leclaire, J.; Vial, L.; West, K. R.; Wietor, J.-L.; Sanders, J. K. M.; Otto, S. Chem. Rev. 2006, 106, 3652.

(3) Li, J.; Nowak, P.; Fanlo-Virgos, H.; Otto, S. Chem. Sci. 2014, 5, 4968.

(4) Li, J.; Nowak, P.; Otto, S. Angew. Chem. Int. Ed. 2015, 54, 833.

(5) Li, J.; Cvrtila, I.; Colomb-Delsuc, M.; Otten, E.; Otto, S. Chem. Eur. J. 2014, 20, 15709.

(6) Li, J.; Carnall, J. M. A.; Stuart, M. C. A.; Otto, S. Angew. Chem. Int. Ed. 2011, 50, 8384.

(7) Nowak, P.; Colomb-Delsuc, M.; Otto, S.; Li, J.\* J. Am. Chem. Soc. 2015, 137, 10965.

(8) Bartolec, B.; Smith, W.; Otto, S.; Li, J.\* in preparation.

**3. 个人简介(中英文)：**

Jianwei Li started his research training in supramolecular chemistry in Prof. Huakuan Lin’s lab at Nankai University. In 2009, he moved to the Stratingh Institute for chemistry, at the University of Groningen (the Netherlands) for his PhD study with Prof. Sijbren Otto, investigating self-assembly in complex chemical systems. In March 2014, he obtained his doctorate degree and then joined the group of Prof. Hagan Bayley in Oxford University, UK as a postdoctoral researcher, where he explored reversible chemical reaction and catalysis in protein nanopores at single-molecule level. From September 2016, he started his independent career funded by Turku Collegium for Science and Medicine (TCSM) as a senior researcher at the department of chemistry, University of Turku. In the following years, he will be leading a group to play the interface between systems chemistry and other emerging fields such as materials chemistry, enzymology and biomedicine. For more details, please refer to the website of our laboratory: [www.li-chemlab.com](http://www.li-chemlab.com)

李健维，于2009年，在南开大学化学系林华宽教授课题组，完成超分子化学方向的硕士学位后，前往荷兰格罗宁根大学Stratingh Institute，攻读系统化学方向的博士学位，师从系统化学的领头人Sijbren Otto教授。期间，他主要对复杂化学体系中的分子自组装行为进行了研究，于2014年3月获得博士学位。随后，他在英国牛津大学Hagan Bayley教授课题组，以蛋白质纳米孔技术为工具，在单分子水平上，对可逆共价化学反应及其在催化方面的应用，进行了为期两年的博士后研究。从2016年9月开始，他在芬兰图尔库药物与科学研究院的资助下，以高级研究员和课题组组长的身份，在图尔库大学化学系建立课题组，开始了独立工作。目前，课题组的研究兴趣主要是将系统化学和材料化学，酶学，以及生物医药等领域相交叉，并开发复杂化学体系在系统水平上的独特性质以及潜在的应用。详情请参考课题组主页：[www.li-chemlab.com](http://www.li-chemlab.com)