



王晓东

汉族，理学博士（清华大学 --- 北京协和医学院），教授，博士生导师，中央民族大学学术带头人（2015-），中央民族大学高层次人才（2016-），入选中华人民共和国国家民族事务委员会第四批“中青年英才培养计划”（2018）。

曾任 Research Scientist & Postdoctoral Fellow (University of Victoria - Genome BC Proteomics Centre , Canada , 2012-2015), Research Scientist (Metabolomics Innovation Centre (TMIC)& Science and Technology Innovation Centre(STIC) , Canada , 2012-2015); Human Proteome Organization (HUPO)、American Society for Mass Spectrometry (ASMS)、American Chemical Society (ACS)、Canadian National Proteomics Network (CNPN)、Canadian Society for Chemistry (CSC) 会员 ; *Molecular & Cellular Proteomics*、*Analytical Chemistry*、*Analytica Chimica Acta*、*Journal of Mass Spectrometry*、*Journal of Proteome Research*、*Proteomics*、*Journal of Proteomics*、*Electrophoresis*、*International Journal of Mass Spectrometry*、*Analytical and Bioanalytical Chemistry*、*Journal of the American Society for Mass Spectrometry*、*Rapid Communications in Mass Spectrometry*、*Metabolomics*、*Methods*、*RSC Advances*、*Analyst*、*Phytochemical Analysis*、*Behavioural Brain Research*、*BioTechniques* 等国际著名期刊同行评阅人(Peer-Reviewer); *Analytical Methods in Chemistry* 特邀客座编辑 (Guest Editor)。

曾荣获“Young Investigator Award, 6th Annual CNPN Symposium , Canada (2014)”，“北京市优秀毕业生奖 (2012 , 证书编号 : 证字第 201210023y014 号)”，*ACTA Biophysica Sincica* 杂志“2009 年度优秀论文”奖，北京协和医学院--清华大学一等奖学金 (2011、2010)、三等奖学金 (2008)、优秀研究生奖 (2011、2010、2009)、助研一等奖学金 (2010、2009)、助研二等奖学金 (2011)、国家生物科学理科基地创新一等奖学金 (2006)。

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讲授课程

- **本科生**：现代仪器分析（54 学时），仪器分析实验（36 学时），蛋白质组学（54 学时），化学导论（每届授课 1 次）（2 学时），制药工程导论（每届授课 1 次）（2 学时），理工科创新班校内专家系列讲座（每届授课 1 次）（2 学时）、文献查新与论文写作（创新班课程）（54 学时）、现代生物学技术（创新班课程）（54 学时）
- **研究生**：现代仪器分析（36 学时），组学研究概论（36 学时）

主要研究领域及内容

研究领域：质谱成像，蛋白质组学，代谢组学，分析化学

研究内容：

I . 生物成像：MALDI/ESI 源质谱成像新技术、新方法研发及应用

- 新型基质筛选用以增强生物内源性化合物（如脂类、能量代谢产物、核苷酸、多肽及蛋白质等）在组织表面质谱检测灵敏度
- 组织特异性蛋白质翻译后修饰定量质谱成像新技术研究
- 基于新型质谱成像技术耦合液质联用分析方法用于药用植物有效成分筛选、药物入体动态监测、药物治疗机制揭示以及慢性疾病生物标志物发现研究
- 基于民族特色药用植物成像蛋白质组学/代谢组学研究

II . 蛋白质组学：药用植物及动物样本蛋白质组学新方法、新技术研发及应用

- 蛋白质复合体及蛋白质相互作用新型分析方法研究
- 蛋白质翻译后修饰（糖基化、磷酸化、甲基化、乙酰化等）定性/定量研究
- 动植物膜蛋白质组学研究
- 基于新型蛋白质组学技术用于慢性疾病个体化诊断及预后标志物筛选研究

主持与参与科研项目

1. 国家自然科学基金面上项目“基于蛋白质复合体组学及质谱原位成像技术研究濒危子遗植物南方红豆杉种子休眠与萌发机制”(项目批准号: 31770384) (主持)
2. 国家自然科学基金青年科学基金项目“新型开源式 MALDI/DESI 双源互补质谱成像技术及其在民族特色药用植物内源性天然产物研究中的应用”(项目批准号: 21605164) (主持)
3. 中央民族大学青年教师科研能力培育项目(项目批准号: 2017QNPY38) (参与)
4. 中央民族大学自主科研项目“多组学分析与多民族群体眼疾病机制的关联性探索研究”(项目批准号: 2017MDYI27) (参与)
5. 中央民族大学自主科研项目“探针—激光解吸离子化质谱分析方法的建立及其在代谢组学中的应用研究”(项目批准号: 2016KYQN39) (参与)
6. 加拿大 Genome Canada-funded “The Metabolomics Innovation Centre (TMIC)” 项目“代谢组学与技术研发(Metabolomics and technology development)” 2013/04-2015/03, 已结题 (参与)
7. 加拿大 Genome Canada-funded “The Metabolomics Innovation Centre (TMIC)” 项目“代谢组学与技术研发(Metabolomics and technology development)” 2011/04-2013/03, 已结题 (参与)
8. 加拿大 Genome Canada and Genome British Columbia 项目 “Proteomics Platform Funding from through the Science and Technology Innovation Centre (S&TIC)”, 已结题 (参与)
9. 国家自然科学基金面上项目“应用质谱技术研究血浆/血清中与肿瘤相关的蛋白质复合物结构”(项目批准号: 21075137), 已结题 (参与)
10. 国家自然科学基金专项基金项目“分化型甲状腺癌相关蛋白异常糖基化与血清学早期诊断”(项目批准号: 81141031), 已结题 (参与)
11. 国家自然科学基金面上项目“溶瘤疱疹病毒增加胰腺癌放疗敏感性作用机制的蛋白质组学研究”(项目批准号: 81071898), 已结题 (参与)
12. 国家自然科学基金专项基金项目“无血清培养筛选分化型甲状腺癌血清标志物及临床验证”(项目批准号: 30940082), 已结题 (参与)
13. 国家自然科学基金面上项目“应用质谱技术探究胰腺癌相关蛋白酶体复合体”(项目批准号: 20675088), 已结题(参与)
14. 高等学校博士学科点专项科研基金项目“生物大分子组装体结构研究的新技术和方法”(项目批准号: 20070023023), 已结题(参与)
15. 国家高技术研究发展计划 (863 计划) 项目“肿瘤细胞泛素-蛋白酶体降解途径中相关新蛋白筛选技术研究”(项目批准号: 2006AA02Z154), 已结题 (参与)

代表性期刊论文 (*Corresponding Author)

1. Huixin He, Liang Qin, Yawen Zhang, Manman Han, Jinming Li, Yaqin Liu, Kaidi Qiu, Xiaoyan Dai, Yanyan Li, Maomao Zeng, Huihong Guo, Yijun Zhou, and **Xiaodong Wang***. 3,4-Dimethoxycinnamic acid as a novel matrix for enhanced in situ detection and imaging of low-molecular-weight compounds in biological tissues by MALDI-MSI. *Analytical Chemistry*, 2019, 91(4):2634-2643. (Top Journal_IF: 6.32) (一区)
2. **Xiaodong Wang**, Jun Han, Juncong Yang, Jingxi Pan, and Christoph H. Borchers*. Matrix Coating Assisted by an Electric Field (MCAEF) for enhanced tissue imaging by MALDI-MS. *Chemical Science*, 2015, 6, 729-738. (Top Journal_IF: 9.2) (一区)
3. **Xiaodong Wang**, Jun Han, Jingxi Pan, and Christoph H. Borchers*. Comprehensive imaging of porcine adrenal gland lipids by MALDI-FTMS using quercetin as a matrix. *Analytical Chemistry*, 2014, 86, 638-646. **Highlighted in a Virtual Issue on Lipidomics-Analytical Chemistry. Cover feature.** (Top Journal_IF: 6.32) (一区)
4. **Xiaodong Wang**, Jun Han, Albert Chou, Juncong Yang, Jingxi Pan, and Christoph H. Borchers*. Hydroxyflavones as a new family of matrices for MALDI tissue imaging. *Analytical Chemistry*, 2013, 85, 7566-7573. (Top Journal_IF: 6.32) (一区)
5. **Xiaodong Wang**, Fenjie Li, Gaoguang Song, Shuai Guo, Hui Liu, Guoqiang Chen, and Zhili Li*. Broad-spectrum four-dimensional orthogonal electrophoresis: a novel comprehensively feasible system for protein complexomics investigation. *Molecular & Cellular Proteomics*, 2012, 11, 786-799. (Top Journal_IF: 9.9) (一区)
6. Liang Qin, Yawen Zhang, Yaqin Liua, Huixin He, Manman Han, Yanyan Li, Maomao Zeng, and **Xiaodong Wang***. Recent Advances in Matrix-assisted laser desorption/ionization mass spectrometry imaging (MALDI-MSI) for in situ analysis of endogenous molecules in plants. *Phytochemical Analysis*, 2018, 29(4), 351-364. (Invited paper_IF: 2.5) (三区)
7. Teesha C. Luehr, Emily M. Koide, **Xiaodong Wang**, Jun Han, Christoph H. Borchers, Caren C. Helbing. Metabolomic insights into the effects of thyroid hormone on rana [lithobates] catesbeiana metamorphosis using whole-body matrix assisted laser desorption/ionization-mass spectrometry imaging (MALDI-MSI). *General and Comparative Endocrinology*, 2018, 265, 237-245. (Invited paper_IF: 2.7) (三区)
8. Huixin He, Lulu Chen, Liang Qin, Yaqin Liu, and **Xiaodong Wang***. Mass spectrometry imaging and its application to in situ analysis of endogenous molecules in plants. *SCIENTIA SINICA Vitae (中国科学•生命科学)*, 2017, 47(10), 1043-1064. (四区)
9. Han Hang, Ma Yanfang, Li Zhengzhen, Lan Yuting Shi Sha, Feng Jinchao, and **Xiaodong Wang***. A novel method for nondenaturing protein extraction from Populus euphratica leaves. *Science Technology and Engineering*, 2018, 18(21) : 36-41 (中文核心)
10. **Xiaodong Wang**, Yujie Liu, Fenjie Li, and Zhili Li*. Poplar catkin: a natural biomaterial for highly specific and efficient enrichment of sialoglycopeptides. *Chinese Chemical Letters*,

2017, 28, 1018-1026. (IF: 2.0) (四区)

11. **Xiaodong Wang**, Jun Han, Darryl B. Hardie, Juncong Yang, Jingxi Pan, and Christoph H. Borchers*. Metabolomic profiling of prostate cancer by matrix assisted laser desorption/ionization-fourier transform ion cyclotron resonance mass spectrometry imaging using matrix coating assisted by an electric field (MCAEF). *Biochimica et Biophysica Acta (BBA) - Proteins and Proteomics*, 2017, 1865, 755-767. (Invited paper_IF: 3.7) (三区)
12. **Xiaodong Wang**, Jun Han, Darryl B. Harde, Juncong Yang, and Christoph H. Borchers*, The use of matrix coating assisted by an electric field (MCAEF) to enhance mass spectrometric imaging of human prostate cancer biomarkers, *Journal of Mass Spectrometry*, 2016, 51, 86-95. (Invited paper_IF: 2.5) (三区)
13. **Xiaodong Wang**, Guoqiang Chen, Hui Liu, Zhiyun Zhao, and Zhili Li*. Four-dimensional orthogonal electrophoresis system for screening protein complexes and protein-protein interactions combined with mass spectrometry. *Journal of Proteome Research*, 2010, 9, 5325-5334. (IF: 5.3) (二区)
14. **Xiaodong Wang** and Zhili Li*. Chemical cross-linking and mass spectrometry for investigation of protein complex structure and protein-protein interactions. *ACTA Biophysica Sincia*, 2009, 25, 157-167. (2009_Excellent Paper) (中文核心)
15. **Xiaodong Wang***, Bingshu He, Huixin He, and Liang Qin. Application of metabolomics in the study of diabetic nephropathy. *Journal of Minzu University of China*, 2017, 26, 58-64.
16. Yaqin Liu, Lulu Chen, Liang Qin, Manman Han, Jinming Li, Feixian Luo, Kun Xue, Jinchao Feng, Yijun Zhou, and **Xiaodong Wang***. Enhanced in-situ detection and imaging of lipids in biological tissues by using 2,3-dicyanohydroquinone as a novel matrix for MALDI-MS Imaging. Submitted to *Chemical Communications*.
17. Liang Qin, Huixin He, Yaqin Liu, Hang Han, Yanyan Li, Yijun Zhou, Jinchao Feng, Jun Han, Carol E. Parker, Christoph H. Borchers, and **Xiaodong Wang***. Caffeic acid as a new matrix for enhanced tissue imaging of high molecular weight proteins by MALDI mass spectrometry. (Manuscript in preparation)
18. Yanying Wang, Gaoguang Song, Yanmin Wang, Ling Qiu, Xuzhen Qin, Hui Liu, Fang Li, **Xiaodong Wang**, Fenjie Li, Shuai Guo, Yaping Zhang, and Zhili Li*. Elevated serum levels of circulating immunoinflammation-related protein complexes are associated with cancer. *Journal of Proteome Research*, 2014, 13, 710-719. (IF: 5.1) (二区)
19. Fenjie Li, **Xiaodong Wang**, Yujie Liu, Hui Liu, and Zhili Li*. Dephosphorylation of intact glycoprotein to greatly improve digestion efficiency coupled with matrix-assisted laser desorption/ionization-Fourier transform ion cyclotron resonance mass spectrometric analysis. *Analytica Chimica Acta*, 2013, 787, 140-147. (IF: 4.7) (二区)
20. Guoqiang Chen, Yanmin Wang, Xuzhen Qin, Hexiang Li, Yumei Guo, Yanying Wang, Hui Liu, **Xiaodong Wang**, Gaoguang Song, Fang Li, Fenjie Li, Shuai Guo, Ling Qiu, and Zhili Li*. Change in IgG1 Fc N-linked glycosylation in human lung cancer: Age- and sex-related

diagnostic potential. *Electrophoresis*, 2013, 34, 2407-2416. (IF: 3.2) (三区)

21. Fang Li, Xuzhen Qin, Haiquan Chen, Ling Qiu, Yumei Guo, Hui Liu, Guoqiang Chen, Gaoguang Song, **Xiaodong Wang**, Fenjie Li, Shuai Guo, Baohua Wang, and Zhili Li*. Lipid profiling for early diagnosis and progression of colorectal cancer using direct-infusion electrospray ionization Fourier transform ion cyclotron resonance mass spectrometry. *Rapid Communications in Mass Spectrometry*, 2013, 27, 24-34. (IF: 2.6) (四区)

22. Guoqiang Chen, Yanmin Wang, Ling Qiu, Xuzhen Qin, Hui Liu, **Xiaodong Wang**, Yanying Wang, Gaoguang Song, Fang Li, Yumei Guo, Fenjie Li, Shuai Guo, and Zhili Li*. Human IgG Fc-glycosylation profiling reveals associations with age, sex, female sex hormones and thyroid cancer. *Journal of Proteomics*, 2012, 75, 2824-2834. (IF: 4.1) (二区)

23. Yumei Guo, Xianmin Wang, Ling Qiu, Xuzhen Qin, Hui Liu, Yanying Wang, Fang Li, **Xiaodong Wang**, Guoqiang Chen, Gaoguang Song, Fenjie Li, Shuai Guo, and Zhili Li*. Probing gender-specific lipid metabolites and diagnostic biomarkers for lung cancer using Fourier transform ion cyclotron resonance mass spectrometry. *Clinica Chimica Acta*, 2012, 414, 135-141. (IF: 2.9) (三区)

24. Zhiyun Zhao, Hui Liu, Xinli Wang, **Xiaodong Wang**, and Zhili Li*. Separation and identification of HSP-associated protein complexes from pancreatic cancer cell lines using 2D CN/SDS-PAGE coupled with mass spectrometry. *Journal of Biomedicine and Biotechnology*, 2011, DOI: 10.1155/2011/193052. (IF: 3.2)

25. Xinli Wang, Guoqiang Chen, Zhiyun Zhao, **Xiaodong Wang**, and Zhili Li*. Proteomics-based Characterization of Protein Complexes from Human Pancreatic Cancer Cell Line. *Chinese Journal of Chemistry*, 2011, 29, 1548-1550. (IF: 1.9) (四区)

26. Guoqiang Chen, Hui Liu, **Xiaodong Wang**, and Zhili Li*. *In vitro* methylation by methanol: proteomic screening and prevalence investigation. *Analytica Chimica Acta*, 2010, 661, 67-75. (IF: 4.7) (二区)

代表性会议论文

1. **Xiaodong Wang**; Huixin He; Liang Qin; Yaqin Liu; Yawen Zhang; Manman Han, 3,4-dimethoxycinnamic acid (DMCA) as a novel matrix for the *in situ* analysis of small metabolites in biological samples by MALDI-TOF-MS. *The 66th ASMS Conference on Mass Spectrometry and Allied Topics*, 2018, San Diego Convention Center, San Diego, CA, 2018.06.03-06.07 (Poster presentation)

2. Liang Qin, Huixin He, Yaqin Liu, Hang Han, Wanqian Feng, Yuting Lan, Xin Liu, Juan Zhang, Yanfang Ma, Tianze Li, and **Xiaodong Wang***, MALDI mass spectrometry imaging as a novel molecular microscopy for *in situ* detection of high molecular weight proteins. *The 17th Beijing Conference and Exhibition on Instrumental Analysis (BCEIA2017)*, 2017, China National Convention Center, Beijing, China, 2017. 10. 09 - 10. 11 (Poster presentation)

3. **Xiaodong Wang**, Huixin He, Liang Qin, Lulu Chen, Yaqin Liu, Caffeic acid as a new matrix for enhanced tissue imaging of high molecular weight proteins by MALDI mass spectrometry. *The 65th ASMS Conference on Mass Spectrometry and Allied Topics*, 2017, Indiana Convention Center, Indianapolis, IN, USA, 2017. 06.04 - 06.08 (**Poster presentation**)
4. **Xiaodong Wang**, Jun Han, Juncong Yang, Jingxi Pan, Christoph H. Borchers, Matrix Coating Assisted by an Electric Field (MCAEF)-LDI Imaging of Prostate Cancer Tissue Biomarkers. *The 14th Human Proteome Organization World Congress (HUPO 2015)*, 2015, Vancouver Convention Centre, Vancouver, Canada, 2015.09.27 - 09.30 (**Poster presentation**)
5. **Xiaodong Wang**, Jun Han, Juncong Yang, Jingxi Pan, Christoph H. Borchers, Imaging of prostate cancer tissue biomarkers by MCAEF (matrix coating assisted by an electric field) - laser desorption/ionization mass spectrometry. *The 11th Annual International Conference of the Metabolomics Society – Metabolomics*, 2015, Hyatt Regency Burlingame, San Francisco, California, USA, 2015. 06. 29 - 07. 02 (**Poster presentation**)
6. **Xiaodong Wang**, Jun Han, Juncong Yang, Jingxi Pan, Christoph H. Borchers, MCAEF (Matrix coating assisted by an electric field): a novel technique for enhanced imaging of biomarker candidates for prostate cancer. *The 63th ASMS Conference on Mass Spectrometry and Allied Topics*, 2015, America's Center, St. Louis, Missouri, USA, 2015. 05. 31 - 06. 04 (**Poster presentation**)
7. **Xiaodong Wang**, Jun Han, Juncong Yang, Jingxi Pan, Christoph H. Borchers, Quercetin as a highly efficient MALDI matrix for negative-ion tissue imaging by FTICR-MS. *The 62th ASMS Conference on Mass Spectrometry and Allied Topics*, 2014, Baltimore Convention Center, Baltimore, MD, USA, 2014. 06. 15 – 06. 19 (**Poster presentation**)
8. **Xiaodong Wang**, Jun Han, Juncong Yang, Jingxi Pan, Christoph H. Borchers, Profiling and imaging of lipids on rat brain and human prostate cancer tissues by negative-ion FTICR-MS using quercetin as a MALDI matrix. *The 97th Canadian Chemistry Conference and Exhibition*, 2014, Hyatt Regency Vancouver, Vancouver, British Columbia, Canada, 2014. 06. 01 - 06. 05 (**Poster presentation**)
9. **Xiaodong Wang**, Jun Han, Juncong Yang, Jingxi Pan, Christoph H. Borchers, Enhancement of lipid sensitivity by negative-ion FTICR-MS using quercetin as a MALDI matrix. *The 6th Annual CNPN Symposium: "Proteome Dynamics in Health and Diseases"*, 2014, Hilton Bonaventure, Montreal, Quebec, Canada, 2014. 04. 14 - 04. 16 (**Oral presentation**)
10. **Xiaodong Wang**, Jun Han, Juncong Yang, Jingxi Pan, Christoph H. Borchers, Enhancement of lipid imaging by negative-ion FTICR-MS using quercetin as a MALDI matrix. *The 6th Annual CNPN Symposium: "Proteome Dynamics in Health and Diseases"*, 2014, Hilton Bonaventure, Montreal, Quebec, Canada, 2014. 04. 14 - 04. 16 (**Poster presentation**)
11. **Xiaodong Wang**, Jun Han, Albert Chou, Juncong Yang, Jingxi Pan, Christoph H. Borchers, Hydroxyflavones as a new family of matrices for MALDI tissue imaging. *The 61th ASMS Conference on Mass Spectrometry and Allied Topics*, 2013, Minneapolis Convention Center, Minneapolis, MN, USA, 2013. 06. 08 - 06. 12 (**Poster presentation**)
12. **Xiaodong Wang**, Jun Han, Albert Chou, Juncong Yang, Jingxi Pan, Christoph H. Borchers, Polyhydroxyflavones as a new family of matrices for MALDI tissue imaging. *The 5th Annual*

CNPN Symposium: "Can Proteomics Fill the Gap Between Genomics and Phenotypes?" 2013, Coast Coal Harbour Hotel, Vancouver, British Columbia, Canada, 2013. 04. 20 - 04. 24 (**Poster presentation**)

13. **Xiaodong Wang**, Fenjie Li, Gaoguang Song, Shuai Guo, Hui Liu, Guoqiang Chen, Zhili Li, A novel comprehensively feasible system profiling of protein complexomics. *The 17th International Biophysics Congress (IUPAB)*, 2011, China National Convention Center, Beijing, China, 2011. 10. 30 - 11. 03 (**Poster presentation**)

14. **Xiaodong Wang**, Gaoguang Song, Fenjie Li, Shuai Guo, Hui Liu, Guoqiang Chen, Zhili Li, Multi-dimensional orthogonal electrophoresis system for screening protein complexes and protein-protein interactions combined with mass spectrometry. *The 3rd Conference and Seminar of the National Analytical Chemistry for life Science*, 2010, Peking University, Beijing, China, 2011. 08. 19 - 08.22 (**Poster presentation**)

15. **Xiaodong Wang**, Gaoguang Song, Yanying Wang, Zhiyun Zhao, Hui Liu, Guoqiang Chen, Zhili Li, Novel 2-DE combined with MALDI-FTICR MS for differential proteins investigation between the serum of normal and leukemia. *National Conference of Mass Spectrometry & the 3rd Conference of world Chinese on Mass Spectrometry*, 2010, Changchun Institute of Applied Chemistry, Changchun, China, 2010. 07. 30 - 08. 01 (**Poster presentation**)

16. **Xiaodong Wang**, Zhili Li, Multi-dimensional orthogonal electrophoresis system (4-DE) for investigation of protein complexes combined with mass spectrometry. *The 58th ASMS Conference on Mass Spectrometry and Allied Topics*, 2010, Salt Palace Convention Center, Salt Lake City, Utah, USA, 2010. 05. 23 - 05. 27 (**Poster presentation**)

17. Christoph H. Borchers, **Xiaodong Wang**, Jun Han, Multiplexed Imaging of Biomolecules in Tissues by MALDI-MS. *The 14th Human Proteome Organization World Congress (HUPO 2015)*, 2015, Vancouver Convention Centre, Vancouver, Canada, 2015.09.27 - 09.30 (**Oral presentation**)

18. Christoph H. Borchers, **Xiaodong Wang**, Jun Han, Multiplexed imaging of biomolecules in tissues by matrix-assisted laser desorption/ionization mass spectrometry. *The 11th Annual International Conference of the Metabolomics Society – Metabolomics*, 2015, Hyatt Regency Burlingame, San Francisco, California, USA. 2015. 06. 29 - 07. 02 (**Poster presentation**)

19. Zhiyun Zhao, **Xiaodong Wang**, Guoqiang Chen, Zhili Li, Two-dimensional Native/SDS PAGE analysis reveals different protein complexes from two pancreatic cell lines. *The 13rd Beijing Conference and Exhibition on Instrumental Analysis*, 2009, Central Garden Hotel, Beijing, China, 2009. 10. 13 - 10. 16 (**Poster presentation**)

授权或已申请专利：

国际专利：

1. System and method for matrix-coating samples for mass spectrometry , 专利授权号：WO2015/196303A1

美国专利：

1. System and method for matrix-coating samples for mass spectrometry , 专利授权号：
US 201701 486.18A1

国内专利：

1. 一种富集唾液酸化糖肽的方法，专利授权号：ZL201410035250.9
2. 一种非变性蛋白质的提取方法及其专用提取液，专利申请号：201810128474.2