

Virtual Symposium: Chemistry and Biology in Extraterrestrial Space

地外生物化学进展国际研讨会 2020/12/15-16

The virtual symposium, entitled “Chemistry and Biology in Extraterrestrial Space”, is organized by MOE Key Laboratory of Bioorganic Phosphorus Chemistry & Chemical Biology, the Department of Chemistry, Tsinghua University, Qian Xuesen Collaborative Research Center of Astrochemistry and SpaceLife Sciences, and Special Committee on the Origin and Evolution of Life. The symposium focuses on recent advances in origins of life, biochemical evolution, in-situ resource utilization, and new detection methods for chemical analysis in outer space. We have eight speakers and two sessions, hold on Dec. 15th, 15:00-17:40 and Dec. 16th, 9:00-11:40 (Beijing time). Four speakers abroad include Prof. Hikaru Yabuta from Hiroshima University (Japan), Dr. Andreas Riedo from Bern University (Switzerland), Dr. Ziwei Liu from MRC–Laboratory of Molecular Biology (United Kingdom), and Prof. Ulrich Müller from UC San Diego (United States). The four speakers from China include Prof. Wei Yao from Qian Xuesen Laboratory, Prof. Ting Zhu from Tsinghua University, Prof. Yan Qiao from Institute of Chemistry, Chinese Academy of Sciences, and Prof. Yufen Zhao from Ningbo University, Xiamen University, and Tsinghua University. Through the symposium we hope to foster interactions and collaborations on astrochemistry and astrobiology amongst scholars from Tsinghua and other national or international institutions.

“地外生物化学进展国际研讨会暨中国空间科学学会空间生命起源与进化专业委员会年会”由生命有机磷化学及化学生物学教育部重点实验室、清华大学化学系、天体化学与空间生命—钱学森空间科学协同研究中心、及中国空间科学学会空间生命起源与进化专委会共同主办。这次线上研讨会聚焦生命起源、地外生物化学进化、地外原位资源利用和地外分子检测等前沿方向的最新进展。本次研讨会邀请了八位报告人，设两个专场，分别为北京时间12月15日下午3:00-5:30和12月16日上午9:00-11:30。四位海外专家分别来自日本广岛大学 (Hikaru Yabuta 教授)、瑞士伯尔尼大学 (Andreas Riedo 博士)、英国剑桥分子生物学实验室 (刘紫薇 博士) 和美国加州大学圣地亚哥分校 (Ulrich Müller 教授)。四位国内专家则分别来自钱学森实验室 (姚伟 教授)、清华大学 (朱听 教授)、宁波大学 (赵玉芬 院士，厦门大学、清华大学教授) 和中国科学院化学研究所 (乔燕 研究员)。我们希望通过这次研讨会促进清华大学、中国空间科学学会空间生命起源与进化专委会及国内相关研究领域学者与国外专家在地外生物化学的交流与合作。

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Schedule

Session 1: 15:00- 17:40, Dec 15, 2020

Beijing time	Speaker
15:00-15:05	Opening statement Yufen Zhao
15:05-15:50	In-situ resource utilization for extraterrestrial survival Wei Yao
15:50-16:35	Laser Ablation Ionization Mass Spectrometry: A novel and sensitive technique for in situ detection of signatures life beyond Earth Andreas Riedo
16:35-17:20	Chemical history of organic macromolecules in the early Solar System: Scientific strategy and expected insights from asteroid Ryugu in light of the observation results obtained by Hayabusa2 Hikaru Yabuta
17:20-17:40	Harnessing energy for the formation, activation and joining of prebiotic building blocks Ziwei Liu

Session 2: 9:00 -11:40 am, Dec 16, 2020

Beijing time	Speaker
9:00-9:45	In vitro selection of a ribozyme that generates GTP from guanosine and trimetaphosphate Ulrich Muller
9:45-10:30	Building mirror-image biology systems Ting Zhu
10:30-11:15	Phosphorus Chemistry and Origin of Life Yufen Zhao
11:15-11:35	Synthetic cellularity in chemical system Yan Qiao
11:35-11:40	Closing statement Lei Liu

Session 1: 15:00- 17:40, Dec 15, 2020

Speaker 1 (15:05-16:50, Dec 15)

Prof. Wei Yao (姚伟)

钱学森实验室

Department of Space Science, Qian Xuesen Laboratory, China Academy of Space Technology

Email: yaowei@qxslab.cn

Talk Title: In-situ resource utilization for extraterrestrial survival

实现地外生存的原位资源利用方法研究

Bio: Prof. Wei YAO is now a principal researcher of China Academy of Space Technology (CAST), the head of the Department of Space Science, Qian Xuesen Laboratory, and also a guest professor at Nanjing University and Xidian University. He received his Ph.D at Shanghai Jiao Tong University in 2000. Then he worked in CEA Grenoble (France) as a postdoc from 2001 to 2003. Since then, he joined in CAST as a research scientist. His main research interest is the planetary habitability, in-situ detection and resources utilization, and multiphase physics.

姚伟，院首席研究员/博士生导师，钱学森实验室空间科学研究部部长兼行星宜居性及可持续探索团队负责人，航天科技集团学术技术带头人及科技委专业组副组长，南京大学及西安电子科技大学兼职教授。2000年在上海交通大学获博士学位，2001~2003年在法国原子能和可替代能源委员会（CEA）从事博士后研究，2003年归国进入中国空间技术研究院工作。长期从事行星宜居性、原位探测与资源利用、多相物理等方向研究，作为项目或课题负责人承担了国家重点研发计划、自然科学基金、民用航天、高分重大专项预研等课题。



Speaker 2 (15:50-16:35, Dec 15)

Dr. Andreas Riedo

Space Research and Planetology, Physics Institute, University of Bern, Switzerland

Email: andreas.riedo@space.unibe.ch

Title: Laser Ablation Ionization Mass Spectrometry: A novel and sensitive technique for in situ detection of signatures life beyond Earth

激光烧蚀电离质谱：一种新的灵敏的地球外生命特征原位探测技术

Bio: Dr. Riedo obtained his PhD in Physics, University of Bern, Switzerland. Currently, he is a scientist and project manager of the European Space Agency's (ESA's) JUICE mission (Particle Environment Package -Lo instrument suite), Space Research and Planetary Sciences Division, Physics Institute, University of Bern, Switzerland. His research focuses on the development of fundamental measurement methodologies using Laser Ablation/Desorption Ionisation Mass Spectrometry (LIMS) for the chemical (elements, isotopes, and molecules) analysis of complex solids, including e.g., semiconductor materials or materials related to space research. He leads the IGLUNA project, entitled, "LDMS for Life", organised by the Swiss Space Centre.

Riedo 博士在瑞士伯尔尼大学获得物理学博士学位。目前他是伯尔尼大学物理研究所空间研究和行星科学部欧洲航天局 JUICE (木星冰月探测器) 任务 (PEP-Lo 仪器套件) 的科学家和项目负责人。他的研究着重于开发基本测量方法，使用激光烧蚀/解吸电离质谱 (LIMS) 对复杂固体进行化学分析 (元素、同位素和分子)，其中包括半导体材料或与空间研究有关材料分析。他领导了由瑞士航天中心组织的 "IGLUNA" 中名为 "LDMS for life" 的项目。



Speaker 3 (16:35-17:20, Dec. 15)

Prof. Hikaru Yabuta

Department of Earth and Planetary Systems Science, Hiroshima University, Japan

Email: hyabuta@hiroshima-u.ac.jp

Talk title: Chemical history of organic macromolecules in the early Solar System: Scientific strategy and expected insights from asteroid Ryugu in light of the observation results obtained by Hayabusa2

早期太阳系中的有机大分子化学：“隼鸟 2 号”的观测结果对研究龙宫小行星的启示

Bio: Prof. Hikaru Yabuta obtained her PhD in chemistry from University of Tsukuba in 2002. Her research interest is chemical evolution of organic molecules in the Solar System small bodies. She has been devoted to the carbonaceous asteroid sample–return mission, Hayabusa2, as a leader of organic macromolecule analysis team in the mission.

Hikaru Yabuta 现为广岛大学地球与行星系统科学系教授。她于 2002 年获得日本筑波大学化学博士学位。她的研究关注太阳系小天体中有机分子的化学演化。她是“隼鸟 2 号”从龙宫小行星样本返回项目中有有机大分子分析小组的项目负责人。



Speaker 4 (17:20-17:40, Dec. 15)

Dr. Ziwei Liu (刘紫微)

MRC–Laboratory of Molecular Biology, Cambridge, UK

Email: zliu@mrc-lmb.cam.ac.uk

Talk title: Harnessing energy for the formation, activation and joining of prebiotic building blocks

利用能量对前生源分子的构建，活化以及连接

Bio: Dr. Ziwei Liu received his PhD degree in Inorganic Chemistry from SKL of Inorganic Synthesis & Preparative Chemistry, Jilin University. He was selected as Simons Foundation Fellow, working with Prof. Robert Pascal in University of Montpellier. He is currently a Post-Doc in MRC-LMB working with Prof. John Sutherland.

刘紫微，英国剑桥分子生物学实验室（MRC-LMB）博士后。2008 年于吉林大学获得学士学位，2013 年于吉林大学获得博士学位。2013 年获得 Simons Foundation 生命起源项目资助，在蒙彼利埃大学从事博士后研究，合作导师：Robert Pascal。2017 年在英国剑桥分子生物学实验室从事博士后研究，合作导师：John Sutherland。



Session 2 Dec 16, 2020 (9:00 -11:40 am)

Speaker 1 (9:00-9:45, Dec 16)

Prof. Ulrich Müller

Department of Chemistry & Biochemistry, UC San Diego

Email: ufmuller@ucsd.edu

Talk title: In vitro selection of a ribozyme that generates GTP from guanosine and trimetaphosphate

鸟苷和三偏磷酸产生GTP的核酶的体外筛选

Prof. Müller obtained his Ph.D. degree at the LMU Munich / Max-Planck Institute for Biochemistry in Martinsried and the Darmstadt Institute for Technology. Since 2006, Uli is a faculty at the University of California, San Diego, in the Department of Chemistry and Biochemistry. Uli's lab uses in vitro selections to generate, and study ribozymes that could be used to generate an RNA world organism in the lab. The underlying question is how life could have originated on early Earth. Uli Müller is first Vice President of the ISSOL Society (International Society for Studies on Origins of Life), organized the 2017 ISSOL conference in San Diego, and co-organized the PCE3 workshop on Prebiotic Chemistry and Early Earth Environments.

Müller 教授于慕尼黑大学/马克斯普朗克生物化学研究所和达姆施塔特技术学院获得博士学位。2006 年至今为加州大学圣地亚哥分校化学与生物化学系教授。**Müller** 教授的研究关注生命如何起源于早期地球。他的实验室使用体外选择来产生核酶，并利用这些核酶在实验室中产生 RNA 世界的有机体。**Uli Müller** 是国际生命起源研究学会（ISSOL Society）的第一副主席，组织了 2017 年 ISSOL 会议，并共同组织了关于前生命化学和早期地球环境的 PCE3 研讨会。



Speaker 2 (9:45-10:30, Dec 16)

Prof. Ting Zhu (朱听)

School of Life Sciences, Tsinghua University

清华大学生命学院

Email: tzhu@tsinghua.edu.cn

Talk title: Building mirror-image biology systems

构建镜像生物学系统

Bio: Prof. Ting Zhu received his B.E. degree in Engineering Mechanics from Tsinghua University, M.S. in Mechanical Engineering from MIT (advisor: Roger Kamm), Ph.D. from the Harvard-MIT Health Sciences and Technology program (advisor: Jack Szostak), and postdoctoral training from the Department of Earth, Atmospheric and Planetary Sciences at MIT and Massachusetts General Hospital (advisors: Maria Zuber and Gary Ruvkun). He is currently a Professor in the School of Life Sciences at Tsinghua University.

朱听，清华大学生命学院教授。2003年本科毕业于清华大学工程力学系，2005年硕士毕业于MIT机械工程系，导师：Roger Kamm，2010年博士毕业于Harvard-MIT健康科学与技术系（HST），导师：Jack Szostak，2010-2011年在MIT地球大气与行星科学系、麻省总医院接受博士后训练，导师：Maria Zuber, Gary Ruvkun。2011年入职清华大学生命学院。



Speaker 3 (10:30-11:15, Dec 16)

Prof. Yufen Zhao (赵玉芬)

Ningbo University, Institute of Drug Discovery Technology
Department of Chemistry, Tsinghua University
College of Chemistry and Chemical Engineering, Xiamen University
宁波大学新药技术研究院,
清华大学化学系, 厦门大学化学系
厦门大学化学化工学院

Email: zhaoyufen@nbu.edu.cn

Talk title: Phosphorus Chemistry and Origin of Life
磷化学与生命起源

Bio: Zhao Yufen, organic chemist, academician of the Chinese Academy of Sciences, dean of the Institute of Drug Discovery Technology of Ningbo University, committee member of the International Conference on Phosphorus Chemistry (ICPC), scientific committee member of the International Society for the Study of the Origin of Life (ISSOL), chairman of the sub-commission on the Origin and Evolution of Life of the Chinese Academy of Space Science. Winner of the International Arbuzov Award in the field of organophosphorus chemistry in 2015. Research fields: bioorganophosphorus chemistry, origin of life, chemical biology.

赵玉芬, 有机化学家, 中国科学院院士, 现任宁波大学新药技术研究院院长, 国际磷化学学会理事, 国际生命起源协会理事, 中国空间科学学会空间生命起源与进化专业委员会主任。2015年获国际阿布佐夫奖-有机磷化学领域。研究领域包括生命有机磷化学、生命起源、化学生物学。



Speaker 4 (11:15-11:35, Dec 16)

Prof. Yan Qiao (乔燕)

Institute of Chemistry, Chinese Academy of Sciences

中国科学院化学研究所

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Talk Title: Synthetic cellularity in chemical system

基于化学体系的人工细胞

Bio: Prof. Yan Qiao obtained her Ph.D. degree at Peking University from College of Chemistry and Molecular Engineering under the supervision of Prof. Jianbin Huang. From 2011 to 2014, Yan worked as a postdoc at Humboldt University of Berlin, Germany, in the Physics Department (advisor: Prof. Jürgen P. Rabe). She then moved to School of Chemistry, University of Bristol, UK for postdoctoral research (advisor: Prof. Stephen Mann FRS). She is currently a Professor in the Institute of Chemistry, Chinese Academy of Sciences. Yan's Lab focus on the chemical and synthetic biology, the protocells in chemical system.

乔燕，中国科学院化学研究所研究员。2011 年于北京大学化学与分子工程学院获得博士学位，师从黄建滨教授；2011-2014 年于德国柏林洪堡大学物理学院从事博士后研究，合作导师为 Prof. Jürgen P. Rabe，2014-2017 年于英国布里斯托大学化学学院做博士后，合作导师为 Prof. Stephen Mann FRS。2017 年入职中国科学院化学研究所，科研致力于生命起源的探索，基于化学体系的人工细胞等领域。

