

Special Session XV

Special Session Basic Information:

专栏题目 Session Title	中文：电力装备绝缘与新型电介质材料 英文：Electrical Equipment Insulation and Advanced Dielectric Materials
专栏介绍和征稿主题 Introduction and topics	
中文： 在“双碳”目标与新型电力系统建设背景下，特高压交直流输电、新能源发电、电力电子装备、电动交通与数据中心等快速发展，电力装备面临更高电场强度、更高温度、更高频、更复杂环境及多物理场耦合等严苛工况。绝缘系统是决定电力装备寿命、可靠性与安全运行的核心，而新型电介质材料则为下一代电力装备提供关键支撑。 本专题聚焦“电力装备绝缘与新型电介质材料”的前沿基础与工程应用，征文方向包括但不限于：纳米复合、功能梯度与智能响应电介质；高温储能聚合物、薄膜电容器与电力电子绝缘；可降解、可回收及可持续绝缘材料；电力装备绝缘失效机理与寿命评估；电—热—力—流多物理场仿真与表征；局部放电、空间电荷与电树枝老化；绝缘状态感知、智能诊断与数字孪生；环保绝缘气体与液体、SF₆替代技术；绝缘结构优化、制造工艺与测试标准化等。 本专题旨在搭建高校、科研院所、电网企业与装备制造企业之间的国际交流平台，促进“材料—装备—系统”跨尺度协同创新，推动先进电介质材料从基础研究走向工程应用。 英文： Against the background of the ‘dual carbon’ goals and the construction of novel power systems, the rapid development of UHV AC/DC transmission, renewable energy generation, power electronic equipment, electric transportation, and data centers is exposing electrical equipment to increasingly harsh operating conditions, including higher electric field strengths, elevated temperatures, higher frequencies, more complex environments, and multi-physics coupling. The insulation system is central to determining the lifetime, reliability, and safe operation of power equipment, while novel dielectric materials provide critical support for next-generation power equipment. This session focuses on frontier fundamentals and engineering applications related to ‘Electrical Equipment Insulation and Advanced Dielectric Materials’. Topics for papers include, but are not limited to: nanocomposite, functionally graded, and smart responsive dielectrics; high-temperature energy-storage polymers, film capacitors, and power electrical insulation; degradable, recyclable, and sustainable insulation materials; insulation failure mechanisms and lifetime assessment of power equipment; electro–thermal–mechanical–fluid multiphysics simulation and characterization; partial discharge, space charge, and electrical treeing aging; insulation condition sensing, intelligent diagnosis, and digital twins; environmentally friendly insulating gases and liquids, and SF₆ alternative technologies; and insulation structure optimization, manufacturing processes, and testing standardization. This session aims to build an international exchange platform among universities, research institutes, power grid companies, and equipment manufacturers; to promote cross-scale collaborative innovation across ‘materials–equipment–systems’; and to advance advanced dielectric materials from fundamental research to engineering applications.	

Special Session Chair(s):



姓名 Name	党智敏
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Organizer's Brief Biography

中文：党智敏，清华大学电机系长聘教授、博士生导师，德国洪堡学者，IEEE Fellow，IET Fellow，中国电工技术学会会士，国家杰出青年科学基金获得者，国家重点研发计划重点专项首席科学家，智能电网国家科技重大专项首席科学家，科学中国人年度人物，中国复合材料学会首届青年科学家奖获得者。目前负责清华大学电机系“先进能源电工材料与器件”创新团队的建设。主要研究方向为强电绝缘介质与器件装备，长期聚焦于介电高分子聚合物材料结构与性能的应用基础研究，开展从微观电介质理论到宏观器件应用的协同创新，提出了聚合物绝缘介电构效调控全栈理论与方法，是我国介电高分子材料和高储能薄膜电容器领域的重要领军人物。特别是在全链条国产化干式直流电容器聚丙烯材料与器件、高储能密度介电聚合物材料和高储能薄膜电容器、介电弹性体及其柔智器件等方向取得一系列特色鲜明的系统性创新成果，推动了我国在电力装备与新型柔智器件的发展，服务国家重大需求。先后主持 40 余项重要项目。在 Nature Reviews Electrical Engineering、Nature Communications 等期刊发表论文 500 多篇，SCI 他引 25000 多次，H 指数 86。撰写/参编专著 10 部，获授权专利 28 件。曾获教育部自然科学一等奖、北京市自然科学一等奖等多项科技成果奖励。连续 12 年入选爱思唯尔中国高被引学者，连续 5 年入选全球顶尖前 10 万科学家名单。担任国际期刊 IET Nanodielectrics 创刊主编和多个国内外刊物编委。

英文：Zhimin Dang is a tenured professor and doctoral supervisor in the Department of Electrical Engineering, Tsinghua University. He is a Humboldt Research Fellow of Germany, an IEEE Fellow, an IET Fellow, a Fellow of the China Electrotechnical Society, a recipient of the National Science Fund for Distinguished Young Scholars, a chief scientist of the National Key R&D Program Special Project, a chief scientist of the National Science and Technology Major Project for Smart Grid, a Science and China Annual Person, and a recipient of the First Young Scientist Award of the Chinese Society for Composite Materials. He is currently responsible for the construction of the "Advanced Energy/Electrical Materials and Devices" innovation team in the Department of Electrical Engineering at Tsinghua University. His main research direction is High-Voltage Insulative Dielectrics and equipment, with a long-term focus on applied fundamental research on the structure and properties of dielectric polymer materials. He carries out collaborative innovation from microscopic dielectric theory to macroscopic device applications, proposes theory and method for full-stack regulating structure-property of polymer insulation dielectrics, and is an important leader in the fields of dielectric polymer materials and high-energy-storage film capacitors in China. In particular, he has achieved a series of distinctive and systematic innovative results in the areas of fully domestically produced polypropylene materials and devices for dry-type DC capacitors across the entire chain, high-energy-density dielectric polymer materials and high-energy-storage film capacitors, and dielectric elastomers and their soft intelligent devices, promoting the development of China's power equipment and new soft intelligent devices and serving major national needs. He has presided over more than 40 important projects. He has published more than 500 papers in journals such as Nature Reviews Electrical Engineering and Nature Communications, with more than 25,000 SCI citations by others and an H-index of 86. He has written or contributed to 10 monographs and obtained 28 authorized patents. He has received multiple science and technology achievement awards, including the First Prize for Natural Science of the Ministry of Education and the First Prize for Natural Science of Beijing. He has been selected as an Elsevier Highly Cited Chinese Researcher for 12 consecutive years and has been included in the list of the world's top 100,000 scientists for 5 consecutive years. He serves as the founding Editor-in-Chief of the international journal IET Nanodielectrics and as an editorial board member of multiple domestic and international journals.

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Organizer's Brief Biography

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英文：Cheng Zhang is a professor at the Institute of Electrical Engineering, Chinese Academy of Sciences (CAS), Deputy Director of the Research Department, and Professor at the University of Chinese Academy of Sciences. His research mainly focuses on pulsed gas discharge and plasma applications. He has led seven projects, including NSFC Key Program, International Cooperation and Exchange Program, and Excellent Young Scientists Fund (Category B), one project under the Science and Technology Innovation 2030—Major Project, and more than 10 other projects, including those funded by CAS. He has published more than 70 papers and holds more than 20 authorized national invention patents. He has received five provincial and ministerial-level awards and the Mao Yisheng Beijing Youth Science and Technology Award. He serves as Associate Editor of High Voltage, Editorial Board Member of Physics of Gases, and Young Editorial Board Member of High Voltage Engineering and High Voltage Apparatus.

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Organizer's Brief Biography

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英文：Zhonglei Li is a Tenured Professor and Doctoral Supervisor at Tianjin University. He has been selected for the Young Elite Scientists Sponsorship Program by CAST and among the first batch of Young Science and Technology Talents in Tianjin, among other honors. His main research focuses on the theory and key technologies of insulation for large-capacity DC cables. He has led four projects funded by the National Natural Science Foundation of China, including the Young Scientists Fund (Category B and Category C) and the General Program. He has published two monographs in Chinese and English, more than 80 SCI-indexed papers, and holds more than 20 authorized invention patents. He also serves as an Executive Council Member of the Cable Subcommittee of the IEEE PES Transmission and Distribution Committee, a Member of the Power Transmission and Transformation Materials Committee of the Chinese Society for Electrical Engineering, Associate Editor of Electrical Materials and Applications, and a Young

Editorial Board Member of Chinese Journal of Electrical Engineering and Journal of Electrical Engineering, among other positions.



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Organizer's Brief Biography

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英文：Yufeng Li is an Associate Professor at the School of Electrical Engineering, Northeast Electric Power University. His current research interests include novel electrotechnical materials and testing technologies for electrical equipment. He focuses on the fabrication and thermodynamic mechanisms of superhydrophobic surfaces and their applications in the field of external insulation in power systems. He has systematically studied the contact angle hysteresis of water droplets on smooth material surfaces, cylindrical surfaces, and porous surfaces within a unified theoretical framework. He has led projects including the Young Scientists Fund of the National Natural Science Foundation of China (Category C) and the Shanxi Provincial Applied Basic Research Program. He has published more than 10 papers in journals such as *Applied Physics Letters*, *Journal of Colloid and Interface Science*, and *IEEE Transactions on Power Delivery*.