3rd ICQMT 2025

3rd International Conference on Quantum Materials and Technologies

Recent progress in MgB2 and iron-based superconducting wires

Distinguished Professor Yanwei Ma

- Deputy Director, Institute of Electrical Engineering, Chinese Academy of Sciences (IEE-CAS), 2023-present
- Professor, IEE-CAS, 2004-present
- Leader of Superconducting Materials Group, IEE-CAS, 2007-present
- Elected as a Fellow of the Institute of Electrical and Electronic Engineers (IEEE) in 2024
- Received The 2019 European Society for Applied Superconductivity (ESAS) Award for Excellence in Applied Superconductivity for outstanding contributions to the development of iron-based superconducting wires, at 14th EUCAS, Glasgow, UK
- Received the National Science Fund for Distinguished Young Scholars of China in 2010, NSFC
- Named as a highly cited researcher in China by Elsevier since 2019
- Elected as a Fellow of China Electrotechnical Society in 2023

Date and Time:
From 26 April to 3 May 2025, exact day&time will be announced later.

Lecture Room:
TBD

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10th ICSM 2025

10th International Conference on Superconductivity and Magnetism

Biography

Yanwei Ma is a professor and Deputy Director of Institute of Electrical Engineering, Chinese Academy of Sciences, Beijing, China. He is an outstanding scientist in the field of practical superconducting materials for large scale applications. He has published more than 400 refereed SCI journal papers, and has given ~90 plenary or invited talks at international conferences. Since the discovery of IBS in 2008, his group was the first to fabricate iron-based superconducting (IBS) wires by using powder-in-tube method. Since then, he has made many significant achievements in high-performance IBS wires and their practical development including coils, joints and cables. He was awarded the "2019 ESAS Award for Excellence in Applied Superconductivity" for outstanding contributions to the development of iron-based superconducting wires. He has also made significant contributions to high-performance MgB2 wires, including nano-carbon doping and IMD long wires. For his “contributions to the development and applications of MgB2 and iron-based superconducting wires”, he was elected as a Fellow of IEEE in 2024.

He has served as a program/advisory committee member in important international conference such as ASC, EUCAS and ISS, and has been a member of editorial/advisory board of SuST and Physica C. He has developed extensive collaboration with researchers in Europe, USA and Asia-Pacific, and hosted the first international workshop on superconducting materials & applications.

Abstract

MgB2 and iron-based superconductors (IBS) discovered in 2001 and 2008 respectively are regarded as new practical superconducting materials after Nb-Ti, Nb3Sn and cuprate superconductors. With Tc up to 39 K, MgB2 is promising to work at around 20 K that can be easily achieved by liquid hydrogen or cryocoolers. In addition to the abundant raw materials and light weight, MgB2 has great potential as cost-effective materials for large-scale applications such as MRI, transformers, generators, power transmission and superconducting magnetic energy storage. On the other hand, IBS with Tc up to 56 K are highly promising candidates for high-field magnet applications such as high-energy accelerators, fusion and NMR due to their ultrahigh upper critical fields and very small anisotropy. Though there are different crystal structures, chemical compositions and superconducting mechanisms for theses two kinds of superconductors, both of them can be made into high-performance wires by low-cost power-in-tube method. At present, MgB2 PIT wires are in the early stages of commercialization, and have been successfully employed in applications such as MRI, fault current limiter, and wind power generator. For IBS wires that are still under laboratory research and development, rapid progress towards applications such as long-length wires, joints, pancake & racetrack coils, and cables, have been made in the recent years. This talk will give an overview of the superconducting properties relevant to applications, key techniques for the fabrication of high-performance wires, and the highlights of recent progress in applications for MgB2 and iron-based superconductors. The prospects of future developments and applications will also be discussed.

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