CAIT 2026 - Track 14

1. Title

AI + Novel Luminescent Materials and Intelligent Optoelectronic Functional Thin Films: Intelligent Design, Precision Fabrication, and Integrated Applications

2. Brief Description of the Session

This special session focuses on the deep integration of artificial intelligence with novel luminescent materials and intelligent optoelectronic functional thin films, systematically exploring the innovative paradigm in which AI technologies drive material computational design, composition screening, structural optimization, process control, and device integration. The session covers the following key directions: AI-driven composition design and performance regulation of fluorescent, phosphorescent, and persistent luminescent materials; intelligent screening and luminescence mechanism optimization of novel functional luminescent systems such as lead-free halides, rare-earth doped materials, and quantum dots; machine learning-based multi-scale materials simulation and property prediction; precise intelligent optimization of material structures including defect engineering, band structure engineering, and energy level alignment; AI-optimized deposition, growth, and annealing processes for functional thin films along with microstructural control; and intelligent performance optimization and integrated applications of luminescent thin films, photodetector thin films, and energy-storage optoelectronic composite thin films. In parallel, the session will delve into common industry challenges, including the enhancement of luminescent material stability, performance breakthroughs in lead-free systems, reproducibility of thin-film fabrication processes, the scarcity of high-throughput experimental data, and cross-scale coordination from materials to devices. Bringing together researchers and engineering experts from the global communities of luminescent materials, optoelectronic thin films, and artificial intelligence, the session aims to promote innovative breakthroughs and industrial implementation of intelligent luminescent materials and thin-film technologies.

3. Call for Papers

Artificial intelligence is profoundly transforming the research paradigm of luminescent materials and optoelectronic functional thin films. The traditional trial-and-error approach to materials discovery and device development is being comprehensively reshaped by data-driven intelligent methods, giving rise to numerous frontier achievements in areas such as intelligent screening of luminescent materials, optimization of thin-film fabrication processes, and performance breakthroughs in optoelectronic devices. AI not only significantly accelerates the entire R&D workflow from composition design to process optimization but also holds the promise of breaking through the traditional physical limits of luminescence efficiency, stability, and integration, injecting powerful momentum into the next generation of displays, lighting, detection, and energy-storage optoelectronic devices.

This symposium, centered on the theme "AI-Driven Novel Luminescent Materials and Intelligent Optoelectronic Functional Thin Films," cordially invites researchers, engineers, and students from both domestic and international institutions engaged in luminescent materials, optoelectronic thin films, artificial intelligence, and related interdisciplinary fields to submit their original research and applied technology achievements in intelligent materials design, computational simulation, process optimization, and device applications, and jointly advance the development and

innovation of intelligent optoelectronic materials.

4. Topics

- Intelligent R&D of Luminescent Materials: AI-driven composition design and performance regulation of fluorescent, phosphorescent, and persistent luminescent materials
- Novel Functional Luminescent Systems: Intelligent screening and luminescence mechanism optimization of lead-free halides, rare-earth doped materials, quantum dots, and other luminescent materials
- Intelligent Computation and Simulation of Materials: Machine learning-based first-principles calculations, molecular dynamics simulations, and property predictions for optoelectronic materials
- Intelligent Structural Optimization of Materials: AI-empowered precise computation and design for defect engineering, band structure engineering, and energy level alignment in optoelectronic materials
- Intelligent Fabrication of Functional Thin Films: AI-optimized deposition, growth, and annealing processes, and microstructural control of optoelectronic functional thin films
- Intelligent Thin-Film Device Applications: Intelligent performance optimization and integrated applications of luminescent thin films, photodetector thin films, and energy-storage optoelectronic composite thin films

5. Brief introducation of Chair and Co-chairs with photo

Zhang Jun, School of Big Data and Intelligent Engineering, Guizhou University of Commerce, Guiyang, China, 550014.

Zhang Jun received his Ph.D. in Physical Electronics from Guizhou University in 2020. He is currently a professor at Guizhou University of Commerce and the academic leader of Electronic Information. He also serves as the Dean of the Department of Information Engineering at Shizhen College, Guizhou University of Traditional Chinese Medicine. His main research interests include novel luminescent materials and devices, intelligent IoT technologies, and digital business technologies.

1.主题

AI+新型发光材料与智能光电功能薄膜——智能设计、精密制备与集成应用

2.专场简介

本专题聚焦人工智能与新型发光材料、智能光电功能薄膜的深度融合，系统探讨 AI 技术驱动材料计算设计、组分筛选、结构优化、工艺调控与器件集成的创新范式。专题重点覆盖以下方向：AI 驱动的荧光、磷光、余辉发光材料组分设计与性能调控；无铅卤化物、稀土掺杂、量子点等新型功能发光体系的智能化筛选与发光机制优化；基于机器学习的多尺度材料模拟与性能预测；缺陷调控、能带工程、能级匹配等材料结构的精准智能优化；功能薄膜沉积、生长、退火工艺的 AI 优化与微观结构调控；以及发光薄膜、光电探测薄膜、储能光电复合薄膜的智能化性能优化与集成应用。同时，专场将深度探讨发光材料稳定性提升、无铅化体系性能突破、薄膜制备工艺可重复性、高通量实验数据稀缺、从材料到器件的跨尺度协同等行业共性难题。汇聚全球发光材料、光电薄膜与人工智能领域的科研工作者与工程技术专家，推动智能发光材料与薄膜技术的创新突破和产业化落地。

3.征稿启事

人工智能正深刻变革发光材料与光电功能薄膜的研究范式。依赖经验试错的传统材料发现与器件开发模式，正被数据驱动的智能方法全面重塑，在发光材料智能筛选、薄膜制备工艺优化、光电器件性能突破等方面催生出大量前沿成果。AI 不仅大幅加速了从成分设计到工艺优化的全流程研发，更有望突破发光效率、稳定性和集成度的传统物理极限，为新一代显示、照明、探测与储能光电器件注入强大动力。本次研讨会以“AI 驱动的新型发光材料与智能光电功能薄膜”为主题，诚挚邀请国内外从事发光材料、光电薄膜、人工智能及相关交叉领域的科研人员、工程技术人员和在校学生踊跃投稿，分享在材料智能设计、计算模拟、工艺优化和器件应用等方面的原创研究成果与应用技术成果，共同推进智能光电子材料的发展与革新。

4.征稿主题

发光材料智能研发：AI 驱动荧光、磷光、余辉发光材料的组分设计与性能调控

新型功能发光体系：无铅卤化物、稀土掺杂、量子点等发光材料的智能化筛选与发光机制优化

材料智能计算与模拟：基于机器学习的光电材料第一性原理计算、分子动力学模拟与性能预测

材料结构智能优化：AI 赋能光电材料缺陷调控、能带工程、能级匹配的精准计算与设计

功能薄膜智能制备：AI 优化光电功能薄膜的沉积、生长、退火工艺与微观结构调控

智能薄膜器件应用：发光薄膜、光电探测薄膜、储能光电复合薄膜的性能智能化优化与集成应用

张俊，贵州商学院大数据与智能工程学院，中国贵阳，550014

张俊于 2022 年获得贵州大学物理电子学专业工学博士学位，现任贵州商学院教授，电子信息学术带头人；兼任贵州中医药大学时珍学院信息工程学部院长；主要研究方向为新型发光材料与器件、智能物联网技术、数字化商业技术。