RamanFrontiers 2026

International Symposium on Advanced Applications of Raman Spectroscopy in Materials and Life Sciences

🔬 RamanFrontiers 2026

International Symposium on Advanced Applications of Raman Spectroscopy in Materials and Life Sciences

Theme: “From Vibrations to Visions – Exploring Matter Through Raman Spectroscopy”

April 2-4, 2026

🎯 Symposium Overview

RamanFrontiers 2026 brings together experts and emerging researchers across physics, chemistry, materials science, and biology to showcase the full spectrum of Raman spectroscopy innovations. From fundamental principles and advanced instrumentation to biomedical and industrial applications, the symposium emphasizes how vibrational spectroscopy enables molecular-scale insight into structure, function, and dynamics across disciplines.

🧩 Symposium Tracks

🔷 Track 1 – Fundamentals and Techniques of Raman Spectroscopy

Comprehensive coverage of all Raman methodologies and their analytical power:
• Conventional Raman Spectroscopy – theory, instrumentation, spectral calibration, and signal optimization
• Confocal Raman Microscopy (CRM) – 3D chemical mapping, depth profiling, and spatial resolution in heterogeneous materials and biological samples
• Resonance Raman Spectroscopy (RRS) – electronic coupling and selective vibrational enhancement
• Surface-Enhanced Raman Spectroscopy (SARS) – plasmonic substrates, sensitivity, and single-molecule detection
• Tip-Enhanced Raman Spectroscopy (TERS) – nanoscale resolution and hybrid SPM coupling

• Coherent Anti-Stokes Raman Scattering (CARS) and Stimulated Raman Scattering (SRS) – nonlinear optical imaging in materials and biological systems
• Spatially Offset Raman Spectroscopy (SORS) – deep-tissue and subsurface analysis
• Time-Resolved and Temperature-Dependent Raman – tracking kinetics, crystallization, and phase transitions
• In-Situ and Operando Raman Spectroscopy – real-time monitoring of catalysis, electrochemistry, and chemical processes
• Portable and Fiber-Optic Raman Systems – field, forensic, and industrial applications

---

🔷 Track 2 – Materials Science and Nanotechnology

• Raman characterization of 2D materials (graphene, MoS_2, WS_2, h-BN, etc.)
• Mapping strain, defects, and doping in semiconductors
• Vibrational signatures of catalysts and energy materials
• Correlation of Raman with XPS, AFM, and TEM for multi-scale analysis

---

🔷 Track 3 – Biological and Biomedical Applications

• Raman and SERS for cellular, tissue, and biofluid diagnostics
• Label-free chemical imaging and metabolic fingerprinting
• Single-cell Raman spectroscopy for disease detection
• Raman-based pathogen and biomarker sensing

🔷 Track 4 – Polymers, Soft Matter, and Industrial Processes

• Raman analysis of polymerization, crystallinity, and degradation
• Process analytical technologies (PAT) using inline Raman
• Quality control and non-destructive testing in industry
• Raman spectroscopy for food, pharmaceutical, and environmental monitoring

---

🔷 Track 5 – Data Science, AI, and Spectral Analysis

• Machine learning for Raman spectral deconvolution and classification
• AI-driven materials identification and pattern recognition
• Data fusion combining Raman, IR, and XPS datasets
• Automated Raman mapping and spectral database development