Sensors and Materials

Call for Papers

Special Issue Proposal

1. Title of Special Issue:

Ceramic- and Glass-based Gas Sensing: Materials, Mechanisms, and Applications

2. Topic Description of Special Issue:

Ceramic and glass materials provide versatile platforms for gas sensing because their electrical, ionic, catalytic, optical, dielectric, and surface properties can change markedly through interaction with gaseous species. Gas detection can therefore be based on changes in electronic or ionic conductivity, electrode potential, impedance, capacitance, optical response, or catalytic behavior. Such sensors are important for environmental monitoring, industrial process control, energy systems, combustion and automotive applications, safety, and healthcare.

Recent advances in functional ceramics and glasses, including metal oxide semiconductors, perovskite and spinel oxides, solid electrolytes, proton- and oxide-ion conductors, mixed ionic-electronic conductors, glasses, glass-ceramics, porous glasses, and ceramic composites, have expanded both sensing mechanisms and operating environments. Control of composition, defect chemistry, crystal or glass structure, microstructure, porosity, grain boundaries, interfaces, catalytic additives, and electrode architecture is central to improving sensitivity, selectivity, response speed, humidity tolerance, operating temperature, and long-term stability.

This Special Issue welcomes original research papers and review articles on gas sensing technologies based on ceramic and glass materials, from fundamental material design and sensing mechanisms to fabrication, device architecture, signal analysis, and practical applications. Resistive, electrochemical, potentiometric, amperometric, impedance-based, capacitive, catalytic, and optical approaches are within scope, together with sensing of H_2, O_2, CO, CO_2, NO_x, NH_3, hydrocarbons, volatile organic compounds, and other gases.

3. Prospective authors are invited to submit original and unpublished work on the following research topics related to this Special Issue.

- Metal oxide semiconductor gas sensors
- Perovskite, spinel, fluorite, and other functional ceramic sensing materials
- Solid-electrolyte and electrochemical gas sensors
- Proton-, oxide-ion-, and mixed ionic-electronic conducting ceramics for gas sensing
- Glass, glass-ceramic, and porous glass sensing materials
- Optical gas sensing using glasses, glass fibers, and ceramic optical materials
- Sol-gel-derived, thin-film, thick-film, nanostructured, and porous sensing materials
- Surface adsorption, catalytic reactions, and gas-solid sensing mechanisms
- Defect chemistry, electronic and ionic transport, grain boundaries, and microstructure
- Interfaces, heterojunctions, junctions, and ceramic/glass-based composites
- Doping, catalytic additives, and noble-metal functionalization
- Resistive, potentiometric, amperometric, impedance, capacitive, and optical sensing
- Detection of H_2, O_2, CO, CO_2, NO_x, NH_3, hydrocarbons, VOCs, and other gases
- High-temperature and harsh-environment gas sensors
- Selectivity enhancement, humidity tolerance, drift suppression, and long-term stability
- Sensor arrays, signal processing, machine learning, miniaturization, and device integration
- Gas sensors for environmental, industrial, energy, automotive, safety, and healthcare applications

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