

## Integrated Optical Biosensors

### Message from the Guest Editor

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Deadline for manuscript  
submissions:  
**31 January 2025**

Integrated optical biosensors are devices that combine optical sensing technologies with microfabrication techniques to acquire images or signals (of light, sound, pressure, taste, smell, touch, etc.) and detect biological analytes with high sensitivity and specificity. These sensors use the interaction between light and biological molecules to generate signals that can be measured and analyzed.

This Special Issue will cover a wide range of advances in this field. Theoretical, numerical, and experimental papers are invited. The scope includes, but is not limited to, the following topics:

1. Integrated bionic optical sensors for vision, hearing, taste, smell, and touch.
2. Optical Transducers that convert biological interactions into optical signals:
  - Surface Plasmon Resonance (SPR): measures changes in the refractive index near the sensor surface.
  - Interferometric Sensors: utilize the interference of light waves to detect changes in the optical path length caused by biological interactions.
  - Resonant Waveguide Grating: measures shifts in the resonance wavelength due to the binding of biomolecules.
3. Biorecognition elements that specifically bind to the target analyte:
  - Antibodies: specific to antigens.
  - Aptamers: short DNA or RNA sequences that bind to specific molecules.
  - Enzymes: bind to substrates and catalyze reactions.
  - Nucleic Acids: complementary DNA or RNA strands.
4. Microfabrication, miniaturization, and mass-production technologies for integrating optical components onto a single chip.
5. Signal processing technologies for converting the raw optical signal into meaningful data, which involves amplification, noise reduction, and data interpretation. Studies on artificial intelligence technologies are encouraged.
6. Various applications:
  - Medical Diagnostics: the detection of biomarkers for diseases such as cancer, diabetes, and infectious diseases.
  - Environmental Monitoring: the detection of pollutants and toxins in water, air, and soil.
  - Food Safety: monitoring of pathogens, allergens, and contaminants.
  - Biotechnology: research applications in genomics, proteomics, and drug discovery.



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