



SEMMIoTicAR Services

PORTABLE MICROFLUIDIC SENSOR FOR MICROPLASTIC DETECTION AND MONITORING

KEY WORDS

MICROPLASTICS,
MICROFLUIDICS,
SENSORS

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DESCRIPTION

A microfluidics-based device has been developed with traps to retain suspended microplastics (MPs), combined with a CMOS photosensor. The use of these devices makes it possible to expand real-time assessment and monitoring capacity (IoT communication) through a purpose-built application. The images are analyzed using machine-learning algorithms to quantify, diagnose, and map this contamination. Through this service, the aim is to position a technological solution among potential adopters, including industries and producers, and to design the implementation of remediation strategies.

AVAILABLE TECHNIQUES AND/OR EQUIPMENT

- SEMMioTicAR (microfluidic device designed to capture MPs based on morphology: fibrous and spherical)
- Microplastic standards and synthetic samples (PA [polyamide], PET [polyethylene terephthalate], PVC [polyvinyl chloride], PP [polypropylene], PE [polyethylene])
- CMOS sensor (Complementary Metal-Oxide-Semiconductor) + single-board computer (Raspberry Pi)
- Advanced equipment for validation of results (conventional techniques for MP detection and characterization: Raman microscopy, SEM [scanning electron microscopy], EDS [energy-dispersive X-ray spectroscopy], FTIR [Fourier-transform infrared spectroscopy])
- In the area of Geographic Information Systems (GIS), use of analysis tools such as QGIS (Quantum GIS), ArcGIS (Arc/Info software), and the R programming language

APPLICATIONS

- MP detection in natural environments (rivers, lakes) and at various water points-of-use (households, community water taps, treatment plants, and industries)
- Data for baseline studies: Initial surveys, diagnostics, and long-term monitoring of trends
- Pollutant particle detection: Diagnostics of contaminant particle size distribution (granulometry)
- Data interpretation to improve production standards and quality
- Validation testing services and environmental impact assessments for informed decision-making
- Spatial statistical analysis: Delivery of comprehensive reports including geographic information and/or area mapping
- Environmental remediation plans: Development and implementation of remediation strategies such as selective membranes and absorbent materials, with designs specifically tailored to the production system