VALIDATION OF ARTIFICIAL INTELLIGENCE TIME RESOLVED FLUORESCENCE METHOD FOR THE REAL-TIME MONITORING OF CRITICAL POLLUTANTS IN INDUSTRIAL AND MUNICIPAL EFFLUENTS

LABORATORY : Institut Lumière Matière
IN COOPERATION WITH : iLM

LEVEL : M1 / M2 / L3
TEAM(S) : FENNEC

KEYWORD(S) :

SCIENTIFIC CONTEXT :

Real-time and continuous monitoring of chemical contaminants in industrial and municipal wastewater treatment facilities allows early detection of critical concentrations as well as better understanding of dynamics and causes of potential environmental threats. Conventional analytical methods are poorly adapted to such monitoring approach because they require expensive and time-consuming sample transfer to offsite laboratories, sample preparation and analytical calibration. To overcome these limitations, we will validate a new concept of measure based on time-resolved fluorescence for continuous in-situ monitoring of critical chemicals such as phosphonates, sulphonates and chelating surfactants (Figure 1). We will test the robustness of the method and train the device (AI) under various environmental parameters (pH, temperature) using mesocosm experiments. Performances of the device will be compared to those of current conventional techniques (e.g. LC-MSMS) in order to bring it to the market.

MISSIONS :

The objective of internship is to develop the mathematical method to study the luminescence spectra of pollutants under different conditions by the deconvolution of instrumental signal, in order to define the signature of each pollutant and train the database for the AI. The AI algorithm will be developed by collaboration with other consortium members by using Swift and Core ML. The second topic of internship will be related to the analysis of lifetime decays curves fitting by non-linear functions (stretched exponential functions) in order to determine the lifetime values and then quantify the compounds. The student will work in a team of researchers for the development of robust in-situ standard addition method that will be utilized for the quantification of specific pollutants in industrial and municipal effluents.

OUTLOOKS :

instrumental analysis, statistics for machine learning, automatization of optical devices

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