



## GRAZING INCIDENCE X-RAY FLUORESCENCE FOR ELEMENTAL ANALYSIS OF AIR PARTICULATE MATTER

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### Background

Air pollution is an important environmental risk that causes adverse effects on human health and ecosystems. The World Health Organization (WHO) reported that deaths attributable to ambient air pollution are mainly caused by heart disease, followed by obstructive pulmonary disease, lower respiratory disease, stroke and lung cancer. Particulate matter (PM) is related to the most severe air pollution induced health effects. X-ray based techniques have found to be suitable for the analysis of aerosols particles captured on membrane filters, since they are fast, accurate and they do not require any sample pre-treatment.

### Objectives

The aim of this PhD project is to develop a method for quantitative analysis of potentially toxic elements in air PM, by means of spectrometers in total reflection configuration (TXRF).

### Methodologies

This project deals with the assessment of a direct method to measure and analyze heavy metals in air particulate matter collected on PTFE filtering membranes. The filters are sandwiched between two polymeric sheets, according to the SMART STORE® sampling preparation procedure. An empirical calibration approach is applied, by directly analyzing samples with TXRF spectrometers. Running experiments at synchrotron would help the definition of the constraints of the method.

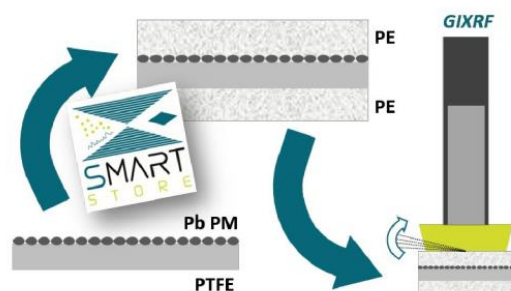


FIGURE 1 - SMART STORE SAMPLE PREPARATION PROCEDURE

### Expected Results and Impact

Since TXRF is a technique that is still not normative recognized, this project would help the development of a standard (whose draft has already been proposed to ISO) for the employment of TXRF spectrometers in the analysis of air filters. By defining the technological characteristics of a dedicated instrumentation for analysis of PM collected on filters, it would be possible to design a prototype spectrometer suitable for the application.