Title:	**Evaluation of two compact NIR spectrometers for the detection of microplastics in soil samples**
Student:	Arnau Luco Colilles
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Supervisor/s:	Dra. Ana Maria de Juan Capdevila *Departament d'Enginyeria Química i Química Analítica, Universitat de Barcelona (UB)* Dr. rer. nat. habil. Michael Maiwald *Bundesanstalt für Materialforschung und -prüfung (BAM)* Daily Supervisors: M.Sc. Lukas Wander, Dr. rer. nat. Andrea Paul *Bundesanstalt für Materialforschung und -prüfung (BAM)*

In the last years, the Process Analytical Technology (PAT) research field has become of great importance due to its connection with the industrial world. This industry related research, along with the evolutionary progress that technology has seen lately, has allowed that key analytical techniques in an industrial environment have undergone a radical development. One of these techniques has been the near-infrared spectroscopy (NIRS). This technique, currently common in "online" industrial analysis, has seen a remarkable revolution, especially since the introduction of the microelectromechanical systems technology (MEMS) in the spectroscopy field. Nowadays it is possible to find compact spectrometers no bigger than a wristwatch in the market. Although there is an unavoidable question: can these compact spectrometers actually compete against the traditional spectrometers?

In this project different calibration parameters of two compact NIR spectrometers ("Spectral Engines Oy NIR-One Sensor NM2.0", with 1550 to 1950 nm range; and "NeoSpectra Si-ware", with 1300 to 2550 nm range) were evaluated, and the obtained results were compared with a reference spectrometer ("Bruker Optik GmbH Matrix-F", with 15000 to 4000 cm^{-1} range). In order to obtain the different calibration parameters, a sequence of quality performance tests were conducted. The results obtained after the different experiments carried out with both compact spectrometers prove that their performance is more than acceptable for routine analysis.

Afterward, model samples of different microplastics in soil at different known concentration were analyzed with all three spectrometers. Chemometric models capable to identify and classify microplastics in soil were established. For this analysis five of the most used plastics worldwide were used: polyethylene (PE), polyethylene terephthalate (PET), polypropylene (PP), polystyrene (PS), and polyvinyl chloride (PVC). After the Principal component analysis (PCA), it

can be seen that only the NIR-One NM2.0 is capable to differentiate all types of microplastics in soil at concentrations of 1–2 %, while the NeoSpectra Si-ware is unable to identify the PET sample.