



Discrimination and classification of polymeric materials combining Laser-Induced Breakdown Spectroscopy and Machine Learning techniques

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ABSTRACT

Laser-Induced Breakdown Spectroscopy (LIBS) is an analytical technique based on the spectral analysis of the light emitted from the plasma which can be induced when a laser beam interacts with a sample. LIBS is a versatile technique permitting the rapid collection of information about the elemental composition of a sample. Contrary to other analytical techniques, LIBS can offer in situ, on-line and standoff analysis of almost any kind of sample.

However, in many cases the structure of the emission spectra obtained can be extremely complex and not allowing to extract useful qualitative/quantitative information about the sample. In this case, the combination of the LIBS technique assisted by some machine learning algorithms to retrieve the spectroscopic information otherwise hidden into the complex spectroscopic data makes the whole process of sample discrimination and authentication extremely successful.

The present work is a demonstration of the application of the above combined approach of LIBS with machine learning techniques for the identification of plastics for recycling purposes, where there is need of previous knowledge of the different types of plastics before they are recycled^[1], as mixing of the different types of plastics can create significant problems in the recycling process.

REFERENCES

[1] Stefas D., Gyftokostas N., Bellou E. and Couris S. 2019. Atoms, 7: 79

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