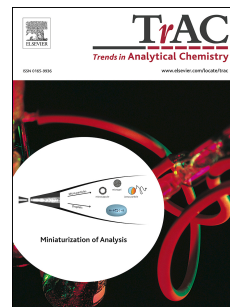


# Accepted Manuscript



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PII: S0165-9936(17)30277-7

DOI: [10.1016/j.trac.2017.10.018](https://doi.org/10.1016/j.trac.2017.10.018)

Reference: TRAC 15036

To appear in: *Trends in Analytical Chemistry*

Received Date: 28 July 2017

Revised Date: 23 October 2017

Accepted Date: 24 October 2017

Please cite this article as: J. Aramendia, L. Gomez-Nubla, K. Castro, S. Fdez-Ortiz de Vallejuelo, G. Arana, M. Maguregui, V.G. Baonza, J. Medina, F. Rull, J.M. Madariaga, Overview of The Techniques Used for The Study of Non-Terrestrial Bodies: Proposition of Novel Non-Destructive Methodology, *Trends in Analytical Chemistry* (2017), doi: 10.1016/j.trac.2017.10.018.

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# OVERVIEW OF THE TECHNIQUES USED FOR THE STUDY OF NON-TERRESTRIAL BODIES: PROPOSITION OF NOVEL NON-DESTRUCTIVE METHODOLOGY

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## **ABSTRACT**

Meteorites and impact glasses have been largely analysed using different techniques, but most studies have been focused on their geological-mineralogical characterization and isotopic ratios, mainly of a destructive nature. However, much more information can be gained by applying novel non-destructive analytical procedures and techniques that have been scarcely used to analyse these materials. This overview presents some new methodologies to study these materials and compares these new approaches with the commonly used ones. Techniques such as X-Ray Fluorescence (XRF) and Laser Induced Breakdown Spectroscopy (LIBS), for elemental characterisation, the hyphenated Raman spectroscopy-SEM/EDS and the combination of them, allow extracting simultaneous information from elemental, molecular and structural data of the studied sample; furthermore, the spectroscopic image capabilities of such techniques allow a better understanding of the mineralogical distribution.

*Keywords:* meteorites; impactites; spectroscopic techniques; imaging techniques; combination procedures.

## **1. INTRODUCTION**

A meteorite is a solid natural object originated in the interplanetary space, from fragments of asteroids, comets and even other planets, which arrives through Earth's atmosphere [1]. Depending on the size of the meteorite, some of them can shock the surface of the Earth or even burst during the entrance through the atmosphere. Therefore, meteorites are composed of the original material of its source (i.e. asteroid, comet or planet) but their mineralogy and composition can vary due to the pressure and temperature conditions suffered during its travel, as well as eventual reactions with the materials at the place of arrival. Impact glasses or impactites, are terrestrial rocks or sediments that have been altered by the heat, pressure and shock waves associated with the impact of an airburst or a large meteorite. Thus, the study

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