



Analytical, Environmental and Geo-Chemistry

has the honor to invite you to the public defense of the PhD thesis of

Katerina Rodiouchkina

to obtain the degree of Doctor of Sciences

Joint PhD with Ghent University

Title of the PhD thesis:

Evaluation and application of sulfur isotopic analysis in samples of biological and geological origin using multi-collector ICP-MS

Promotors:

Prof. dr. Steven Goderis (VUB)

Prof. dr. Frank Vanhaecke (UGent)

The defense will take place on
Tuesday, May 23, 2023 at 15:00 in faculty board meeting room 3.3, building S2, campus Sterre, Gent University

The defense will be live streamed, contact
Katerina.Rodiouchkina@ugent.be for the link.

Members of the jury

Prof. dr. Mieke Adriaens (UGent, chair)

Prof. dr. ir. Christophe Snoeck (VUB, secretary)

Prof. dr. Philippe Claeys (VUB)

Prof. dr. Martine Leermakers (VUB)

Dr. Lieve Balcaen (UGent)

Prof. dr. ir. Pascal Boeckx (UGent)

Prof. dr. José Ignacio Garcia-Alonso (UNIOVI)

Prof. dr. Nadine Mattielli (ULB)

Curriculum vitae

This PhD study was carried out in the context of an 'Excellence of Science – EOS' project "ET-Home": Evolution and Tracers of the Habitability Of Mars and Earth funded by FWO-FNRS. Katerina's time as a PhD student has resulted in 7 peer-reviewed scientific publications in international journals, 3 as 1st author and 4 as a co-author, and one 1st author manuscript in preparation. In addition, the work in the 3 published 1st author papers has also been presented at three international conferences. The four 1st author papers form the basis for the four experimental chapters in her PhD thesis.

Abstract of the PhD research

Sulfur (S) is an interesting element to study, both from a biological and geological perspective, due to its ubiquity in the universe, great versatility of species, important role in many geochemical systems, and it being an essential building block for all known life forms. Complementary to S elemental analysis, S isotopic analysis is a useful tool for identifying, separating, and tracking a wide array of atmospheric, hydrological, geological, and biological processes, as many of these are accompanied by traceable fractionation of the S isotopes.

The main goals of this PhD research were to evaluate and refine existing methods for bulk S isotopic analysis using multi-collector inductively coupled plasma-mass spectrometry (MC-ICP-MS), as well as to develop and validate a novel method for species-specific S isotopic analysis using capillary electrophoresis (CE) hyphenated to MC-ICP-MS and subsequently using these methods for high-end geological and biological applications. These applications consisted of an investigation of post-impact climate effects that are thought to have led to the Cretaceous-Paleogene (K-Pg) mass extinction of non-avian dinosaurs following the Chicxulub asteroid impact event approximately 66 million years ago and a study on the extent hair and nails can be utilized as chronological recorders of diet, physiology, residence location, and exposure for the corresponding individual.