



Universiteit
Leiden
The Netherlands

Miniaturized metabolomics methods for enabling the study of biomass-restricted samples

He, B.

Citation

He, B. (2025, May 1). *Miniaturized metabolomics methods for enabling the study of biomass-restricted samples*. Retrieved from <https://hdl.handle.net/1887/4239100>

Version: Publisher's Version

License: [Licence agreement concerning inclusion of doctoral thesis in the Institutional Repository of the University of Leiden](#)

Downloaded from: <https://hdl.handle.net/1887/4239100>

Note: To cite this publication please use the final published version (if applicable).

Miniaturized metabolomics methods for enabling the study of biomass-restricted samples

Bingshu He 何秉淑

The publication of the thesis was financially supported by:
Leiden University Libraries

Cover design: Bingshu He

Thesis layout: Bingshu He

Printing: PrintSupport4U

© Copyright, Bingshu He, 2025

ISBN: 978-94-93289-77-2

All rights reserved. No part of this book may be reproduced in any form or by any means without permission of the author.

Miniaturized metabolomics methods for enabling the study of biomass-restricted samples

Proefschrift

ter verkrijging van

de graad van doctor aan de Universiteit Leiden,

op gezag van rector magnificus prof.dr.ir. H. Bijl,

volgens besluit van het college voor promoties

te verdedigen op donderdag 01 mei 2025

klokke 16:00 uur

door

Bingshu He 何秉淑

geboren te Chifeng, China

in 1993

Promotores

Prof. dr. T. Hankemeier

Dr. R. Ramautar

Co-promotor

Dr. A. C. Harms

Promotiecommissie

Prof. dr. H. Irth (Chair)

Prof.dr. E.C.M. de Lange (Secretary)

Prof. dr. M. van der Stelt

Dr. E. Dominguez-Vega

Leiden University Medical Center, the Netherlands

Prof. dr. D. Y. Chen

The University of British Columbia, Canada

Dr. R.J. Vreeken

Maastricht University, the Netherlands

The research described in this thesis was performed at Metabolomics and Analytics Center (MAC) of the Leiden Academic Centre for Drug Research (LACDR), Leiden University (Leiden, The Netherlands). The research was financially supported as indicated in each chapter.

见微知著

From the minute to the profound

Contents

Chapter I	General introduction and scope	1
Chapter II	Analytical techniques for biomass-restricted metabolomics: an overview of the state-of-the-art <i>Microchemical Journal (2021)</i>	13
Chapter III	Quantification of endocannabinoids in human cerebrospinal fluid using a novel micro-flow liquid chromatography-mass spectrometry method <i>Analytica Chimica Acta (2022)</i>	41
Chapter IV	A micro-flow liquid chromatography-mass spectrometry method for the quantification of oxylipins in volume-limited human plasma <i>ELECTROPHORESIS (2024)</i>	65
Chapter V	Capillary Electrophoresis-Mass Spectrometry for Creatinine Analysis in Residual Clinical Plasma Samples and Comparison with Gold Standard Assay <i>ELECTROPHORESIS (2024)</i>	97
Chapter VI	Conclusions and perspectives	113
Appendix	Summary	124
	Nederlandse samenvatting	127
	Curriculum vitae	130
	List of publications	131
	Acknowledgements	132