



**Nina OGRINC, PhD**

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ORCID: 0000-0002-0773-0095,

**Analytical chemist with a strong instrumentation and method development background in mass spectrometry**

**Expert in Mass Spectrometry Imaging (MSI) and detection of specific biomarkers (lipids, metabolites, proteins) in various biological applications**

## Education

**01.10.2011 - 03.04.2015**

**PhD Analytical Chemistry, Department of low and medium energy physics, Jožef Stefan Institute and University of Ljubljana (Ljubljana Slovenia)**



**Thesis title :** Elemental and molecular characterization of biological tissue with a focused high-energy ion beam

**Supervisors :** Dr. Primož Pelicon and Prof. Marjan Veber.

**01.10.2010 - 27.09.2011**

**Diploma thesis – Chemistry, University of Ljubljana (Ljubljana, Slovenia)**

**Thesis title :** Characterization of volatile organic compounds from cardboard

**Supervisor :** Dr. Irena Kralj-Cigić

**01.10.2005 - 01.10.2010**

**Undergraduate school – Chemistry, University of Ljubljana (Ljubljana, Slovenia)**

## Academic Professional Experience

**03.10.2018 - present**

**Postdoctoral researcher in laboratory PRISM U1192 Inserm, University of Lille (Lille, France)**

**Specific projects :**

- In charge of SpiderMass project for in vivo real-time cancer diagnostics, prognostics and guided surgery in an operating room
- Detection of diagnostic and prognostic markers in FFPE human sarcoma tissue

**Methodologies applied :** Atmospheric Pressure Infrared Matrix-Assisted Laser Desorption-Ionization Mass Spectrometry (SpiderMass), Matrix-Assisted Laser Desorption Ionization (MALDI), Desorption ElectroSpray Ionization (DESI)

**01.06.2014 – 01.06.2018**

**Postdoctoral researcher in Division of Imaging Mass Spectrometry, Maastricht MultiModal Molecular Imaging Institute (M4I) (former FOM, AMOLF), (Maastricht, The Netherlands)**

**Hypothesis :** Application of mass spectrometry imaging techniques (MSI) can map and identify specific molecular biomarkers (lipids, metabolites, proteins) for neurodegenerative diseases and brain plasticity.

**Acquired skills :** (i) Skills in all aspects of mass spectrometry imaging: from sample preparation to data analysis. (ii) Data analysis with all commercially available software, mMass, statistical analysis with in-house built software in Matlab, Scils

**Specific projects :**

- Identification of lipid and metabolite biomarkers in Ischemia post-stroke (also 3D imaging) and during zebra finch ontogeny
- Extraction of endogenous peptides and proteins coupled with Laser-Microdissection and MSI in Alzheimer mouse mode
- NIH project, developing strategies to image metabolites in cancer tissue
- Ca imaging in regenerative cells, iron deposits and lipid imaging of plaque deposits in Alzheimer's, surface analysis of catalysts and polymers in collaboration with DSM (Netherlands).
- Imaging on organics preserved in cross-sections of geological samples

**Methodologies applied :** Matrix-Assisted Laser Desorption Ionization Mass Spectrometry, Secondary Ion Mass Spectrometry, Laser-Microdissection, Electro-Spray Ionization, Specific matrix application protocols, Specific derivatization protocols, Data analysis with imaging software.

**01.10.2011-1.06.2014**

**Researcher at Department of low and medium energy physics, Jožef Stefan Institute (Ljubljana, Slovenia) PhD**

**Title :** Elemental and molecular characterization of biological tissue with a focused high-energy ion beam

**Hypothesis :** Development of the MeV SIMS and Particle Induced X-ray Emission (PIXE) dual imaging technique at the nuclear microprobe will provide complementary elemental and molecular information of biological tissues

**Technical Skills :** handling of different samples (cells and tissue sections), physical mechanisms of high-energy desorption processes and different imaging methodologies, technical handling of the "home-made" mass spectrometer, usage of different acquisition and processing software

**Methodologies applied :** Analysis with High-energy (MeV) Secondary ion mass spectrometry, Particle Induced X-Ray Emission, as well as other ion beam methods such as Elastic Backscattering Spectroscopy (EBS) and Scanning Transmission Ion Microscopy (STIM) in combination with micro-PIXE. Data analysis of spectra and images with Origin, PyMca, GUPIX and GeoPIXE, Matlab developed software

**01/01/2010-01/07/2010**

**Erasmus Internship, Faculty of Chemistry, University of Valencia (Valencia, Spain)**

**Specific projects :**

- Analysis of phosphates and detergents with high-pressure liquid chromatography (HPLC) and UV-VIS spectroscopy

**Private Professional Experience**

01/01/2012-01/06/2014

Reseracher LOTRIČ Metrology ltd. (Selca, Slovenia)

**Specific projects :**

- In charge of several metrology projects
- Responsible for leading the accreditation for the environmental chemistry lab in Lotric Certificiranje ltd

## Publications in Peer-review Journals

The overall citation of the 21 peer-reviewed articles is over 380 and current h-index is 11 (Google Scholar). Three of my articles have been cited > 50 times, and further two have been cited > 20 times

\*Denotes corresponding author

†Denotes first co-author

1. **N. Ogrinc**, P. Saudemont, J. Balog, Y.-M. Robin, J.-P. Gimeno, Q. Pascal, D. Tierny Z. Takats, M. Salzet, I. Fournier, Water-assisted laser desorption/ionisation mass spectrometry for minimal invasive in vivo and real-time surface analysis using SpiderMass, Nat. Prot., 2019
2. S. Lazzaro, **N. Ogrinc**, L. Lamont, G. Vecchio, G. Pappalardo, R. M. A. Heeren, Ion mobility spectrometry combined with multivariate statistical analysis: revealing the effects of a drug candidate for Alzheimer's disease on A $\beta$ 1-40 peptide early assembly, Anal. Bioanal. Chem, 2019
3. B. Jenčič, L. Šepec, P. Vavpetič, M. Kelemen, Z. Rupnik, M. Vencelj, K. Vogel-Mikuš, **N. Ogrinc Potočnik**, S. R. Ellis, Ron M.A Heeren, P. Pelicon, Stigmatic imaging of secondary ions in MeV-SIMS spectrometry by linear Time-of-Flight mass spectrometer and the TimePix detector, Nucl. Instr. Meth. Phys. Res B, 2019
4. I. A. Mulder, **N. Ogrinc Potočnik**†, L.A.M Broos, A. Prop, M.J.H. Wermer, R.M.A Heeren, AMJM van den Maagdenberg, Distinguishing core from penumbra by lipid profiles using Mass Spectrometry Imaging in a transgenic mouse model of ischemic stroke, Sci. Rep
5. L. Lamont, M. Baumert, **N. Ogrinc Potočnik**, M. Allen, R. Vreeken, R. M. A. Heeren, T. Porta. 'Integration of Ion Mobility MSE after Fully Automated, Online, High Resolution Liquid Extraction Surface Analysis Micro-Liquid Chromatography'. Anal. Chem, 2017, 11143–50. (IF 6.3; 14 citations)
6. **N. Ogrinc Potočnik**, G. L. Fisher, A. Prop, and R. M. A. Heeren. 'Sequencing and Identification of Endogenous Neuropeptides with Matrix-Enhanced Secondary Ion Mass Spectrometry Tandem Mass Spectrometry'. Anal Chem, 2017, 89, (IF 6.3; 10 citations)
7. B. Jencic., L. Jeromel, **N. Ogrinc Potočnik**, K. Vogel-Mikuš, P. Vavpetič, Z. Rupnik, K. Bučar, et al. 'Molecular Imaging of Alkaloids in Khat (Catha Edulis) Leaves with MeV-SIMS'.Nucl. Instr. Meth. Phys. Res B, 2017, 40 (IF 1.1; 1 citations)
8. F.P.Y. Barre, R.M.A. Heeren, and **N. Ogrinc Potočnik**\*. 'Mass Spectrometry Imaging in Nanomedicine: Unraveling the Potential of MSI for the Detection of Nanoparticles in Neuroscience'. Curr. Pharm. Des, 2017, 23 (IF 3.0; 4 citations)

9. G. L Fisher, A. L. Bruinen, **N. Ogrinc Potočnik**, J. S. Hammond, S. R. Bryan, P. E. Larson, R.M.A. Heeren. 'A New Method and Mass Spectrometer Design for TOF-SIMS Parallel Imaging MS/MS.' *Anal. Chem*, 2016, 88 (IF 6.3; 53 citations)
10. A. Cassese, S. Ellis, **N. Ogrinc Potočnik**, E. Burgermeister, M. Ebert, A. Walch, A. M. J.M. van den Maagdenberg, L. A. McDonnell, R.M.A. Heeren, B. Balluff: 'Spatial autocorrelation in mass spectrometry imaging.' *Anal. Chem.*, 2016, 88 (IF 6.3; 10 citations)
11. S. R Ellis, J. Cappell, **N. Ogrinc Potočnik**, B. Balluff, J. Hamaide, A. Van der Linden, R.M.A. Heeren. 'More From Less: High-Throughput Dual Polarity Lipid Imaging of Biological Tissues.' *The Analyst*, 2016, 141 (IF 3.9; 16 citations)
12. **N. Ogrinc Potočnik**, T. Porta, M. Becker, R. M. A. Heeren, S. R. Ellis. 'Use of advantageous, volatile matrices enabled by next-generation high-speed matrix-assisted laser desorption/ionization time-of-flight imaging employing a scanning laser beam.' *Rapid Commun. Mass Spectrom*, 2015, 29 (IF 2.2; 70 citations)
13. B. Jenčič, L. Jeromel, **N. Ogrinc Potočnik**, K. Vogel-Mikuš, E. Kovačec, M. Regvar, Z. Siketić, P. Vavpetič, Z. Rupnik, K. Bučar, M. Kelemen, J. Kovač, P. Pelicon. 'Molecular imaging of cannabis leaf tissue with MeV-SIMS method' *Nucl. Instr. Meth. Phys. Res B*, 2015, (IF 1.1; 12 citations)
14. P. Vavpetič, K. Vogel-Mikuš, L. Jeromel, **N. Ogrinc Potočnik**, P. Pongrac, D. Drobne, Ž. Pipan Tkalec, S. Novak, M. Kos, Š. Koren, M. Regvar, P. Pelicon. 'Elemental distribution and sample integrity comparison of freeze-dried and frozen-hydrated biological tissue samples with nuclear microprobe.' *Nucl. Instr. Meth. Phys. Res B*, 2015, 348 (IF 1.1; 22 citations)
15. L. Jeromel, Z. Siketić, **N. Ogrinc Potočnik**, P. Vavpetič, Z. Rupnik, K. Bučar, P. Pelicon. 'Development of mass spectrometry by high energy focused heavy ion beam: MeV SIMS with 8 MeV C17+ beam.' *Nucl. Instr. Meth. Phys. Res B*, 2014, 332 (IF 1.1; 20 citations)
16. P. Pelicon, N. C. Podaru, P. Vavpetič, L. Jeromel, **N. Ogrinc Potočnik**, S. Ondračka, A. Gott dang, D. J. M. Mous. 'A high brightness proton injector for the Tandatron accelerator at Jožef Stefan Institute.' *Nucl. Instr. Meth. Phys. Res B*, 2014, 332 (IF 1.1; 19 citations)
17. **N. Ogrinc Potočnik**, K. Skraskova, B. Flinders, P. Pelicon, R. M A Heeren. 'Gold Sputtered Fiducial Markers for Combined Secondary Ion Mass Spectrometry and MALDI Imaging of Tissue Samples.' *Anal. Chem.*, 2014, 86 (IF 6.3; 7 citations)
18. S. Tomić, J. Dokić, S. Vasilijić, **N. Ogrinc**, R. Rudolf, P. Pelicon, D. Vučević, P. Milosavljević, S. Janković, I. Anžel, J. Rajković, M. Slak Rupnik, B. Friedrich, M. Colić. 'Size-Dependent Effects of Gold Nanoparticles Uptake on Maturation and Antitumor Functions of Human Dendritic Cells In Vitro' *PLoS ONE*, 2014, 9(5), (IF 2.8; 63 citations)
19. P. Vavpetič, P. Pelicon, K. Vogel-Mikuš, N. Grlj, P. Pongrac, L. Jeromel, **N. Ogrinc**, M. Regvar: 'Micro-PIXE on thin plant tissue samples in frozen hydrated state: A novel addition to JSI nuclear microprobe' *Nucl. Instr. Meth. Phys. Res B*, 2014, 306 (IF 1.1; 21 citations)
20. D. Drobne, S. Novak, M. Golobic, J. Zupanc, A. Gianoncelli, M. Kiskinova, B. Kaulich, P. Pelicon, P. Vavpetic, L. Jeromel, **N. Ogrinc**, D. Makovec, T. Romih. 'Cellular Internalization of Dissolved Cobalt Ions from Ingested CoFe<sub>2</sub>O<sub>4</sub> Nanoparticles: In Vivo Experimental Evidence.' *Environ. Sci. Technol*, 2013, 47(10) (IF 6.1; 33 citations)
21. **Nina Ogrinc**, Primož Pelicon, Primož Vavpetiča, Mitja Kelemena, Nataša Grlj, Luka Jeromel, Sergej Tomić, Miodrag Čolić, Alfred Beran: 'Quantitative assay of element mass inventories in

## Scientific Communications

### Invited Talks

1. The 22nd International Conference on Secondary Ion Mass Spectrometry, Kyoto, Japan, Oct 2019: "Under construction: Increasing ionization efficiencies of intact biomolecules from tissues"
2. American Vacuum Society 64th International Symposium and Exhibition, Tempa, Florida Nov 2017: "Surface analysis of intact biomolecules: The bigger they are the harder they fly"
3. 2D and 3D Mass Spectrometry: New Trends workshop, 65th ASMS Conference on Mass Spectrometry and allied Topics, Indianapolis, Indiana, June 2017: "Biological SIMS MS/MS"
4. European Molecular Imaging Meeting, ESMI study group Imaging Mass Spectrometry, Cologne, Germany, April 2017: "Seeing the big picture: unraveling the critical period for song learning in zebra finch ontogeny by complementing MSI with MR imaging"
5. Profile area biomedical science-brainstorm meeting: The role of iron in neurodegenerative diseases, LUMC, Leiden, The Netherlands, December 2015: "Mass spectrometry imaging of brain tissue"
6. EU FP7 project GlowBrain Final Conference, Zagreb, Croatia, May 2015: "Neurodegenerative disease and other brain studies with mass spectrometry imaging"
7. 14th International Conference on Nuclear Microprobe Technology and Applications, Padova, Italy, 2014: "Dual elemental and molecular imaging by MeV SIMS and microPIXE on biological tissue samples"

### Oral presentations

1. Annual Congress of in Clinical Mass Spectrometry (MSACL), Salzburg, Austria 2019: Towards rapid *in vivo* molecular diagnostics with SpiderMass real-time analysis
2. Spectrométrie de Masse et Analyse Protéomique (SMAP), Strasbourg, France 2019: "Towards *in vivo* molecular diagnostics of esogastric cancer with SpiderMass real-time, mini invasive analysis"- **keynote lecture**
3. International Secondary Ion Mass Spectrometry (SIMS XXI) Conference, Krakow, Poland 2017: "Tissue imaging of intact biomolecules: from lipids towards de-novo peptide sequencing with ME-SIMS",
4. 65th ASMS Conference on Mass Spectrometry and allied Topics, Indianapolis, Indiana, June 2017 "Molecular insights of the song learning behaviour of Zebra Finch during ontogeny with multimodal mass spectrometry imaging"
5. American Vacuum Society 63th International Symposium and Exhibition, Nashville, Tennessee, November 2016 "ME-SIMS revisited: attempting to unlock the potential using advancements in sample preparation and SIMS technology"
6. International Secondary Ion Mass Spectrometry (SIMS XX) Conference, Seattle, USA, September 2015 "Biomolecular investigation of neurodegenerative diseases and brain plasticity with TOF SIMS tandem MS" imaging
7. GlowBrain Final Conference, Zagreb, Croatia, May 2015: "Neurodegenerative disease and other brain studies with mass spectrometry imaging"

## Funding

- Marie Curie recruit, Brainpath FP7 IAAP, 2014, funded post-doc at M4i Institute, Maastricht, Netherlands

- Coordinated Research Project (CRP) “Development of molecular concentrations mapping techniques using MeV focused ion beams”, International Atomic Energy Agency (IAEA), 2014, 6 k€

### Supervision and mentoring activities

- Responsible for Secondary Ion Mass Spectrometry training and supervision of students and core lab facilities, 2016-2018
- 2014 : bachelor student Klara Ščupakova at AMOLF, Amsterdam Netherlands
- 2015 : PhD intern Magdalena Kania at M4I, Maastricht University, Netherlands
- 2016 : bachelor student Wesley Suntjes at M4I, Maastricht University, Netherlands
- 2018 : PhD Marie Curie secondment Serena Lazzaro at M4I, Maastricht University, Netherlands
- 2018 : Co-supervision internship Mohamed Kassem at M4I, Maastricht University, Netherlands
- 2019 : Daily supervisor Master student Pierre-Damien Caux, Lille University, France
- 2019 : Daily supervisor Bachelor Student Antione Spiers, Lille University, France
- 2019 : Daily supervisor Erasmus Mundus program Diego Fernando Garcia del Rio, University of Lille
- 2019 : Daily supervisor Erasmus Mundus program Diego Fernando Garcia del Rio, University of Lille

### Teaching activities

- Tutor at Maastricht University, Life Sciences-Chemistry for the future, Winter-Spring 2017.
- Lab supervision Maastricht Science Program, Spring 2017
- Mass Spectrometry Imaging workshop, lecturer- SIMS introduction, November 2017, Maastricht University, Maastricht, the Netherlands

### Outreach activities

- Labroots Webinar 12.09.2019: Clinical Uses of Mass Spectrometry  
[https://www.youtube.com/watch?v=gbLwMLyk\\_Hs&t=2278s](https://www.youtube.com/watch?v=gbLwMLyk_Hs&t=2278s)
- Participation in the Mass Spectrometry Imaging workshop (M4I), Maastricht, Netherlands September 2017: Main Lecture on SIMS technology
- Main coordinator for “open-days” at the Department of Low and Medium Energy Physics, IJS, Ljubljana Slovenia