

Sebastiaan Van Nuffel

PhD in Analytical Chemistry,
Specialized in Biological & Clinical Imaging Mass Spectrometry

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Recent Appointments

- December 2020 – **Assistant Professor (Tenured)**
- Today Location: Faculty of Science and Engineering as well as the M4I Division of Imaging Mass Spectrometry, Maastricht University
Activity: I will start building a research program and group focusing on expanding and connecting ToF-SIMS imaging to other levels of information in order to help us understand disease and biology from atoms to anatomy. I received tenure on January 28, 2022.
- January 2020 – **Assistant Research Professor (NTT)**
- December 2020 Location: Materials Characterization Laboratory (MCL), Materials Research Institute (MRI), Pennsylvania State University
Activity: I established independent collaborations with PSU faculty as well as industrial partners and obtained internal and external funding to sustain this research.
- January 2019 – **Postdoctoral Scholar**
- December 2019 Location: Materials Characterization Laboratory (MCL), Materials Research Institute (MRI), Pennsylvania State University
Activity: I conducted biological ToF-SIMS research in the Materials Characterization Laboratory (MCL) of the Materials Research Institute (MRI) as well as the research group of Professor Nicholas Winograd within the Department of Chemistry.

- January 2017 - **Postdoctoral Researcher**
- December 2018 Location: Natural Product Chemistry Institute (ICSN), French National Center for Scientific Research (CNRS)
Supervisor: Dr. Alain Brunelle
Activity: I was part of Dr. Alain Brunelle's Mass Spectrometry Group at the Natural Product Chemistry Institute (ICSN) of the French National Center for Scientific Research (CNRS). I worked on a variety of different projects within the scope of the DEFIMAGE (Project ID: ANR-15-CE29-0007) and CHEWING (Labex Ceba Strategic Project 2017-2019) grants.
- November 2016 - **Research Assistant**
- December 2016 Location: School of Pharmacy, University of Nottingham
Supervisor: Dr. Mischa Zelzer
Activity: Led a two-month project to design and test a new sample holder for correlative cryo-SEM and cryo-ToF-SIMS imaging of frozen cells.

Education

- 2016 PhD, School of Pharmacy, University of Nottingham (UK)
Supervisors: Dr. Mischa Zelzer and Dr. Noah Russell
Thesis title: "Three-dimensional Time-of-Flight Secondary Ion Mass Spectrometry Imaging of Primary Neuronal Cell Cultures"
- 2013 MSc in Chemistry, University of Antwerp (BE)
Supervisor: Prof. Luc Van Vaeck
Thesis title: "Preliminary Research of Molecular Depth Profiling with ULAM-S-SIMS of Industrial Laminate Systems"
- 2011 BSc in Chemistry, University of Antwerp (BE)
Supervisors: Prof. Luc Van Vaeck and Prof. Koen Janssens
Thesis titles: "Optimization of the Imaging of coated Fibers with Time-of-flight (TOF) Static Secondary Ion Mass Spectrometry (S-SIMS)" and "Comparison of the Analysis Possibilities of Paint Samples using various FTIR Techniques"

Honors and Awards

- 2020 ACS Editors' Choice
- 2019 BMSS John Beynon Travel and Conference Fund
- 2019 Travel Grant for Early Career Scientists from the Analytical Division of the Royal Society of Chemistry
- 2019 Travel bursary from the Early Career Researchers Fund of the Institute of Physics
- 2018 Travel Grant for Early Career Scientists from the Analytical Division of the Royal Society of Chemistry
- 2016 Overseas Conference Travel Grant from the Analytical Chemistry Trust Fund

2013 MSc in Chemistry awarded cum laude

2011 BSc in Chemistry awarded cum laude

Selected Funding, Grants and Contracts

Ongoing

- 2023 – 2025 European Commission: MSCA Postdoctoral Fellowship (Dr. Caroline Bouvier)
Role: Primary Supervisor
Title: “Synergistic Combination of Immunolabeling and Molecular Imaging Technologies for Art Research (SCIMITAR)”
- 2023 – 2025 CZI: Advancing Imaging Through Collaborative Projects (PI: Dr. Ian Anthony)
Role: Co-PI
Title: “Fast Mass Spectrometry Imaging for Immunohistochemistry”
- 2022 – Present Atoms2Anatomy Fund (UFL/SWOL)
Role: Trustee
Scope: The Atoms2Anatomy Fund supports the development of Dr. Sebastiaan Van Nuffel’s research group at Maastricht University. The general aim of this group is the development and application of imaging mass spectrometry techniques in life sciences research and a specific goal is the development of a multi-scale approach to investigate biological models and clinical samples from atoms to anatomy.
- 2021 – Present PhD student (4y) provided by the Sectorplan Bèta en Techniek
Role: PI
Title: “The Development of Multiscale Multiomic Approaches using ToF-SIMS in the Context of Biomedical Research Applications”

Completed (within the last 3 years)

- 2020 – 2022 PSU Pathway to Partnerships (P3) Stage 2 Application (PI: Prof. Neil Christensen)
Role: Co-PI
Title: “Papillomavirus-induced tumor tissue imaging using two novel mass spectrometry methods: TOF-SIMS and MIBI-TOF”
- January 2019 – Management ToF-SIMS Facility, Pennsylvania State University
December 2020 Role: I co-managed the ToF-SIMS core facility at the Materials Characterization Laboratory.

Articles in Peer-Reviewed Journals

176 citations, H-index: 5 (Google Scholar, 5 June 2023)

8. Anderson, H.J., Sahoo, J.K., Wells, J., **Van Nuffel, S.**, Dhowre, H.S., Oreffo, R.O.C., Zelzer, M., Ulijn, R.V., Dalby, M.J. (2022) Cell-controlled dynamic surfaces for skeletal stem cell growth and differentiation. *Scientific Reports*, 12, 8165.
7. Bouvier, C., **Van Nuffel, S.**, Walter, P., Brunelle, A. (2022). TOF-SIMS Imaging in Cultural Heritage: a focus on old paintings. *Journal of Mass Spectrometry*, e4803.
6. Tuck, M., Blanc, L., Touti, R., Patterson, N.H., **Van Nuffel, S.**, Villette, S., Taveau, J.C., Römpp, A., Brunelle, A., Lecomte, S., Desbenoit, N. (2021). Multimodal Imaging Based on Vibrational Spectroscopies and Mass Spectrometry Imaging Applied to Biological Tissue: A Multiscale and Multiomics Review. *Analytical Chemistry*, 93(1), 445-477.
5. **Van Nuffel, S.**, Ang, K.C., Lin, A., Cheng, K. (2021). Chemical Imaging of Retinal Pigment Epithelium in Frozen Sections of Zebrafish Larvae using ToF-SIMS. *Journal of the American Society for Mass Spectrometry*, 32(1), 255-261.
4. **Van Nuffel, S.**, Quatredeniens, M., Pirkl, A., Zakel, J., Le Caer, J.P., Elie, N., Vanbellingen, Q., Dumas, S., Nakhleh, M., Ghigna, M., Fadel, E., Humbert, M., Chaurand, P., Touboul, D., Cohen-Kaminsky, S., Brunelle, A. (2020). Multimodal Imaging Mass Spectrometry to Identify Markers of Pulmonary Arterial Hypertension in Human Lung Tissue using MALDI-ToF, ToF-SIMS and Hybrid SIMS. *Analytical Chemistry*, 92(17), 12079-12087.
3. **Van Nuffel, S.**, Elie, N., Yang, E., Nouet, J., Touboul, D., Chaurand, P. & Brunelle, A. (2018). Insights into the MALDI Process after Matrix Deposition by Sublimation using 3D ToF-SIMS Imaging. *Analytical Chemistry*, 90(3), 1907-1914.
2. **Van Nuffel, S.**, Parmenter, C., Scurr, D. J., Russell, N. A., & Zelzer, M. (2016). Multivariate analysis of 3D ToF-SIMS images: method validation and application to cultured neuronal networks. *Analyst*, 141(1), 90-95.
1. Vercammen, Y., Moons, N., **Van Nuffel, S.**, Beenaerts, L., & Van Vaeck, L. (2013). Experimental study of the organic ion intensity distribution in the ion imaging of coated polymer fibres with S-SIMS. *Applied Surface Science*, 284, 354-365.

Book Chapters

3. C. Bouvier, A. Brunelle & **S. Van Nuffel**. Transferable Mass Spectrometry Methods: Examination of Authenticity in Artwork. In *Applications of Mass Spectrometry for the Provision of Forensic Intelligence* (Chapter 14). Royal Society of Chemistry, London, UK. (Submitted and accepted.)
2. L. Blanc, A. Brunelle, C. Courrèges, N. Desbenoit, I. Fournier, J. Franck, L. Labeyrie, S. Mounicou, J.-Y. Salpin, D. Schaumlöffel, M.A. Subirana, D. Touboul, M.D. Tuck, **S. Van Nuffel** & M. Wisztorski. *Imagerie par Spectrométrie de Masse : Principes et Applications*. ISTE, Encyclopédie Science, Chimie Analytique, Chapitre XXX. (Submitted and accepted.)

1. **Van Nuffel, S.** & Brunelle, A. (2022). TOF-SIMS Imaging of Biological Tissue Sections and Structural Determination Using Tandem MS. In *Mass Spectrometry Imaging of Small Molecules* (pp. 77-86). Humana, New York, NY.

Invited Talks

12. "Integrative ToF-SIMS Imaging: Applications and Outlook", Webinar GDR-MSI, France, 21 October 2022.
11. "Answering Biomedical Questions Using Integrative ToF-SIMS Imaging", 23rd International Conference on Secondary Ion Mass Spectrometry (SIMS23), Minneapolis, MN, USA, 18-23 September 2022.
10. "Mass Spectrometry and Mass Spectrometry Imaging to Examine Authenticity in Artwork", International Mass Spectrometry Conference (IMSC2022) Focus Group Forensics, Maastricht, The Netherlands, 30 August 2022.
9. "ToF-SIMS at Maastricht University: Applications and Future Work", Virtual PHI User Meeting, Minneapolis, MN, USA, 21-22 September 2021.
8. "Identifying Markers of Pulmonary Arterial Hypertension in Human Lung Tissue using Multimodal Imaging Mass Spectrometry", Virtual MSIS OurCon MS Imaging Seminar, UK, 16 June 2021.
7. "Chemical Imaging of Retinal Pigment Epithelium in Frozen Sections of Zebrafish Larvae Using ToF-SIMS", Webinar: Third Annual Penn State College of Medicine Research Cores Symposium, Hershey, PA, USA, 18-19 November 2020.
6. "Chemical Imaging of Retinal Pigment Epithelium in Frozen Sections of Zebrafish Larvae Using ToF-SIMS", PHI's Virtual Fall Workshop, Minneapolis, MN, USA, 17-19 November 2020.
5. "Time-of-Flight Secondary Ion Mass Spectrometry: Biological Applications", Making the Best of a Bad Situation characterization webinar series organized by the Pennsylvania State University, the University of Illinois, the University of Wisconsin and the University of Minnesota, USA, 13 May, 2020.
4. "Imaging Mass Spectrometry: Answering Biomedical Questions using Spatially Resolved Chemical Information", Department of Pathology and Anatomical Sciences Grand Rounds, University at Buffalo, Buffalo, NY, USA, 20 November 2019.
3. "Label-Free Chemical Imaging of Tissues and Single Cells using Imaging Mass Spectrometry", Webster Science Café Talk, PSU Post Doc Society, Pennsylvania State University, State College, PA, USA, 29 August 2019.
2. "3D Label-Free Chemical Imaging of Tissues and Single Cells using Imaging Mass Spectrometry", Millennium Café, Pennsylvania State University, University Park, PA, USA, 23 April 2019.
1. "Understanding MALDI through 3D ToF-SIMS Imaging", NESAC/BIO, University of Washington, Seattle, WA, USA, 16 November 2017.

Oral Presentations at Refereed Conferences

7. "ToF-SIMS Imaging of Zebrafish Pigmented Cells", 22nd International Conference on Secondary Ion Mass Spectrometry (SIMS22), Miyakomesse, Kyoto, Japan, 20-25 October 2019.
6. "ToF-SIMS Imaging of Biological Tissue: Challenges and Opportunities", 2019 PHI User's Meeting, Minneapolis, MN, USA, 10-11 September 2019.
5. "Gazing at Titian's Ecce Homo with Imaging Mass Spectrometry", SIMS Europe 2018, Physical Institutes of the University of Münster, Münster, Germany, 16-18 September 2018.
4. "Advanced ToF-SIMS Image Analysis: PCA, Random Forests and Applications", 8th Annual French ION-TOF User's Meeting, Esch-sur-Alzette, Luxembourg, 15-16 March 2018.
3. "Understanding MALDI through 3D ToF-SIMS Imaging", 21st International Conference on Secondary Ion Mass Spectrometry (SIMS21), Jagiellonian University, Kraków, Poland, 10-15 September 2017.
2. "3D ToF-SIMS Imaging of Primary Cell Cultures", SIMS Europe 2016, Physical Institutes of the University of Münster, Münster, Germany, 18-20 September 2016.
1. "3D ToF-SIMS Imaging of Primary Neuronal Cultures", RSC Biomaterials Chemistry Meeting, University of Birmingham, Birmingham, United Kingdom, 7-8 January 2016.

Teaching Experience

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| Period 4, 2023 | Coordinator, Advanced Image Processing and Artificial Intelligence (MIE1007), Faculty of Science and Engineering, Maastricht University |
| Period 3, 2023 | Coordinator, Research and Engineering Project I (PRO4004), Faculty of Science and Engineering, Maastricht University |
| Period 3, 2023 | Planning Group Member, Pre-clinical Imaging (MBS1501), Faculty of Health, Medicine & Life Sciences, Maastricht University |
| Period 2, 2022 | Coordinator, Imaging Engineering (CEN2005), Faculty of Science and Engineering, Maastricht University |
| Period 2, 2022 | Guest Lecturer, Advances in Biomedical Sciences (SCI3050), Faculty of Health, Medicine & Life Sciences, Maastricht University |
| Period 4, 2022 | Planning Group Member, Pre-clinical Imaging (MBS1501), Faculty of Health, Medicine & Life Sciences, Maastricht University |
| Period 1, 2021 | Co-coordinator, Academic Skills and Project Management (SKI1101), Faculty of Science and Engineering, Maastricht University |
| Period 6, 2021 | Tutor, Critical Appraisal of Biomedical Publication (BBS1006), Faculty of Health, Medicine & Life Sciences, Maastricht University |

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| June 13, 2019 | Guest Lecturer, Chemistry Research Experience Undergraduate (REU) Program, Pennsylvania State University Seminar titled: "3D Label-Free Chemical Imaging of Tissues and Single Cells using Time-of-Flight Secondary Ion Mass Spectrometry" |
| Autumn 2017 | Lecturer, Unités d'Enseignements (UE): Méthodologies en Protéomique for the M2 Ingénierie et Chimie des Biomolécules (ICBM) organized by Dr. Virginie Redeker, Université Paris-Saclay Course on the fundamentals and instrumentation of mass spectrometry given to master's students in class sizes averaging 10 students. |

Mentorship

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| BSc students | As a PhD student, I co-supervised undergraduate students during their bachelor thesis projects. I compiled reading lists for their literature review and helped them set up experimental plans, analyze data and writing their thesis. |
| MSc students | During my time as a postdoc with the CNRS, I co-supervised the master thesis project of a foreign exchange student. As an assistant professor at the UM, I organize the first project period of the master Imaging Engineering. |
| PhD students | As an assistant professor at the UM, I currently supervise one PhD student in my group. |
| Postdocs | As an assistant professor at the UM, I currently supervise one postdoctoral researcher in my group and co-supervise another. I also co-supervised a postdoctoral researcher during 2021. |

Reviewer Duties

For an up-to-date overview of my reviewer duties, please visit my author profile at webofscience.com.

Committees and Boards

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| 2020 - 2022 | International scientific committee member of the SIMS-23 conference |
| 2021 - today | M4I Representative for the Platform Scientific Integrity (FHML/MUMC+) |
| 2021 - today | Board of Admissions (BoA) for the MSc Imaging Engineering (FSE) |
| 2022 - today | Trustee of the Atoms2Anatomy Fund (UFL/SWOL) |

Scientific Memberships

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| 2023 - today | British Mass Spectrometry Society (BMSS) |
| 2023 - today | American Society for Mass Spectrometry (ASMS) |

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| 2021 – today | Nederlandse Vereniging voor Massaspectrometrie (NVMS) |
| 2015 – today | Institute of Physics (MInstP) |
| 2015 – today | Royal Society of Chemistry (MRSC) |

Licenses & Certifications

Course Small Group Teacher Training (tutor, coach, etc.)

FHML, Maastricht University, June 2021- no expiration date.

Examiner course

FHML, Maastricht University, February 2021- no expiration date.

Introductory course on the principles of PBL

FHML, Maastricht University, January 2021- no expiration date.

BSAFE

UNDSS, ID 2894679, October 2020 - no expiration date.

EMI Professional Development Series

FEMA, October 2020 - no expiration date.

Responsible Conduct of Research (RCR) – Basic

CITI Program, ID 36108122, July 2020 - no expiration date.

Essentials of Research Administration

CITI Program, ID 37446213, July 2020 - July 2023.

Good Laboratory Practice (GLP)

CITI Program, ID 37388889, July 2020 - July 2023.

GCP for Clinical Trials with Investigational Drugs & Medical Devices (U.S. FDA Focus)

CITI Program, ID 37388888, July 2020 - July 2023

Protection of Human Research Subjects - Biomedical course

CITI Program, ID 37446161, July 2020 - July 2023.

IONTOF Level 2 TOF.SIMS 5 Maintenance Certificate

IONTOF GmbH.

Languages

Dutch native proficiency

English bilingual proficiency

French professional working proficiency