

# Curriculum Vitae

---

**Nicole Strittmatter**

12 Church Street, Haslingfield, Cambridge CB23 1JE

Email: nici-ns@gmx.net, Tel: +44 (0)7469 408291

Date of Birth: 15/05/1987, Nationality: German

## Work Experience

---

**Since 06/2019 Associate Principal Scientist at AstraZeneca, Cambridge, UK**

**04/2015 to 05/2019 Senior Scientist at AstraZeneca, Cambridge, UK.**

Position as Research Scientist and DESI imaging expert in a mass spectrometry imaging group within the Clinical Pharmacology and Safety Sciences – Pathology group. The MSI group is supporting pre-clinical studies globally within AZ R&D with main focus area in oncology. Role involves initial communication with project leaders, cryosectioning, method development and data acquisition, data analysis, report writing and communicating data back to the project. Predominantly using DESI imaging platform on a Thermo Q-Exactive instrument and Fluidigm Hyperion CyTOF platform, less frequently using Waters TQ-S DESI imaging, Waters MALDI Synapt G2 and Bruker RapifleX platforms. More recent areas of work involve increasing amounts of multimodal imaging techniques beyond MSI (imaging mass cytometry, IHC, H&E, multiplex IF) and data integration. Role also involves preparation of and contribution to manuscripts and attending and presenting at scientific meetings as well as supervision of student projects and visiting collaborators. Leading an internal science engagement forum (>1 year) and establishing a cross-functional imaging in drug delivery discussion group.

Promotion to APS includes additional responsibilities involving decisions around project prioritisation, establishing and leading internal and external collaborations, initiating and participating in grant proposals.

Secondment in Oncology DMPK ADME group doing drug metabolite identification, quantification and structure elucidation on a UV-LC-FTMS system for a variety of pre-CDID drug projects (01.07.-31.12.2018).

**11/2011 to 03/2012 Research Assistant, Institute for Inorganic and Analytical Chemistry, Justus-Liebig University Giessen.**

Research Topic: Characterisation of the direct coupling of thin-film microextraction and desorption electrospray ionisation mass spectrometry for the application to wastewater matrices; comparison to LC-MS and SPE/LC-MS; in-situ experiments.

## Education and Qualifications

---

**2012-2016**

**PhD in Medicine, Department of Surgery and Cancer, Imperial College London.**

Thesis title: *Development of novel mass spectrometric methods for the characterisation and identification of microorganisms.*

Development of a rapid mass spectrometric characterisation and identification method for microorganisms and human cell lines based on Rapid Evaporative Ionisation Mass Spectrometry (REIMS). A spectral database was generated comprising >4k different strains of bacteria and fungi and >100 different predominantly human cell lines. Specificity of a REIMS-based characterisation and identification method was tested on different taxonomical levels from phylum- to subspecies-level using multivariate statistical methods. Metabolite identifications were performed using exact mass measurements, tandem mass spectrometry and LC-MS/MS experiments. Identification of taxon-specific bacterial metabolites to map presence of bacteria in DESI imaging datasets of human colorectal tissues.

Preparation and DESI imaging of various murine and human tissue specimens as part of collaborations with other PhD students, researchers from other universities and pharmaceutical industry.

Managing and maintenance of DESI imaging facilities and group's laboratory at Charing Cross Hospital.

**10/2009 to 09/2011**

**MSc in Chemistry, Justus-Liebig University Giessen, Germany.**

I performed my Master studies in Chemistry with specialisation to analytical chemistry with special emphasis on mass spectrometry instrumentation, MALDI MS and MALDI imaging experiments, LC-MS, and ambient ionisation methods for small molecule analysis.

Thesis Title: *Environmental Analytics of Pharmaceuticals in Wastewater Using Thin-Film Microextraction and High-Resolution Desorption Electrospray Ionisation Mass Spectrometry.*

Pharmaceuticals and personal care products (PPCPs) get increasingly recognised as organic pollutants in the environment with wastewater treatment plants as point sources for their introduction into receiving waters and thus surface and ground waters. During my MSc thesis, I took and prepared wastewater samples using thin-film microextraction (TFME), a variation of SPME, and analysed them using high-resolution DESI-MS for PPCPs. Development of a targeted LC-MS method for carbamazepine and triclosan as model compounds to validate DESI-MS experiments.

**10/2006 to 10/2009**

**BSc in Chemistry, Justus-Liebig University Giessen, Germany.**

Thesis Title: *Thermoanalytic and Electron Microscopic Characterisation of Special Inorganic Nanoscaled Dusts.*

Nanoscaled dusts that were previously used in animal studies were characterised using differential scanning calorimetry, X-ray crystallography, thermogravimetric analysis and transmission electron microscopy.

**08/1997 to 06/2006**

**Alexander-von-Humboldt Gymnasium, Lauterbach, Germany.**

Abitur exams taken in English, Chemistry, Mathematics, German, History. Languages learnt English (9 years), French (4 years) and Latin (4 years).

## Publications

---

### Peer-reviewed research papers

1. **Strittmatter N**, Jones EA, Veselkov KA, Rebec M, Bundy JG, Takats Z. Analysis of intact bacteria using rapid evaporative ionisation mass spectrometry. *Chemical Communications* **2013**, 49(55):6188-90. DOI: 10.1039/c3cc42015a
2. **Strittmatter N**, Rebec M, Jones EA, Golf O, Abdolrasouli A, Balog J, Behrends V, Veselkov KA, Takats Z. Characterization and identification of clinically relevant microorganisms using rapid evaporative ionization mass spectrometry. *Analytical Chemistry* **2014**, 86(13): 6555-62. DOI: 10.1021/ac501075f
3. Swales JG, Tucker JW, **Strittmatter N**, Nilsson A, Cobice D, Clench MR, Mackay CL, Andren PE, Takáts Z, Webborn PJ. Mass spectrometry imaging of cassette-dosed drugs for higher throughput pharmacokinetic and biodistribution analysis. *Analytical Chemistry* **2014**, 86(16): 8473-80. DOI: 10.1021/ac502217r
4. Veselkov KA, Mirnezami R, **Strittmatter N**, Goldin RD, Kinross J, Speller AVM, Abramov T, Jones EA, Darzi A, Holmes E, Nicholson JK, Takats Z. Chemo-informatic strategy for imaging mass spectrometry-based hyperspectral profiling of lipid signatures in colorectal cancer. *Proceedings of the National Academy of Sciences of the United States of America* **2014**, 111(3): 1216-21. DOI: 10.1073/pnas.1310524111
5. Abbassi-Ghadi N, Veselkov KA, Kumar S, Huang J, Jones EA, **Strittmatter N**, Kudo H, Goldin RD, Takáts Z, Hanna GB. Discrimination of lymph node metastases using desorption electrospray ionisation-mass spectrometry imaging. *Chemical Communications* **2014**, 50(28): 3661-4. DOI: 10.1039/c3cc48927b
6. Liebeke M, **Strittmatter N**, Fearn S, Morgan AJ, Kille P, Fuchser J, Wallis D, Palchykov V, Robertson J, Lahive E, Spurgeon DJ, McPhail D, Takats Z, Bundy JG. Unique metabolites protect earthworms against plant polyphenols. *Nature Communications* **2015**, DOI: 10.1038/ncomms8869
7. Inglese P, **Strittmatter N**, Doria ML, Mroz AK, Speller AVM, Poynter L, Dannhorn A, Kudo H, Mirnezami R, Goldin RD, Nicholson JK, Takats Z, Glen RC. Network analysis of mass spectrometry imaging data from colorectal cancer identifies key metabolites common to metastatic development. *bioRxiv* **2018**. DOI: <https://doi.org/10.1101/230052>
8. Golf O, **Strittmatter N**, Karancsi T, Pringle SD, Speller AV, Mroz A, Kinross JM, Abbassi-Ghadi N, Jones EA, Takáts Z. Rapid evaporative ionization mass spectrometry imaging platform for direct mapping from bulk tissue and bacterial growth media. *Analytical chemistry* **2015**, 87(5): 2527-34. DOI: 10.1021/ ac5046752
9. Abbassi-Ghadi N, Jones EA, Veselkov KA, Huang J, Kumar S, **Strittmatter N**, Golf O, Kudo H, Goldin RD, Hanna GB, Takats Z. Repeatability and reproducibility of desorption electrospray ionization-mass spectrometry (DESI-MS) for the imaging analysis of human cancer tissue: a gateway for clinical applications. *Analytical Methods* **2015**, 7: 71-80. DOI: 10.1039/C4AY01770F
10. Guenther S, Muirhead LJ, Speller AV, Golf O, **Strittmatter N**, Ramakrishnan R, Goldin RD, Jones EA, Veselkov K, Darzi A, Takats Z. Spatially resolved metabolic phenotyping of breast cancer by desorption electrospray ionization mass spectrometry. *Cancer Research* **2015**. DOI: 0008-5472.CAN-14-2258
11. Oetjen J, Veselkov K, Watrous J, McKenzie JS, Becker M, Hauberg-Lotte L, Kobarg JH, **Strittmatter N**, Mróz AK, Hoffmann F, Trede D, Palmer A, Schiffler S, Steinhorst K, Aichler M, Goldin R, Guntinas-Lichius O, von Eggeling F, Thiele H, Maedler K, Walch A, Maass P, Dorrestein PC, Takats Z, Alexandrov T. Benchmark datasets for 3D MALDI-

and DESI-imaging mass spectrometry. *GigaScience* **05/2015**. DOI: 10.1186/s13742-015-0059-4

12. Ashton S, Song YH, Nolan J, Cadogan E, Murray J, Odedra R, Foster J, Hall P, Low S, Taylor P, Ellston R, Polanska U, Wilson J, Howes C, Smith A, Goodwin RJA, Swales JG, **Strittmatter N**, Takáts Z, Nilsson A, Andren P, Trueman D, Walker M, Reimer CL, Troiano G, Parsons D, De Witt D, Ashford M, Hrkach J, Zale S, Jewsbury S, Barry ST. Aurora kinase inhibitor nanoparticles target tumors with favorable therapeutic index in vivo. *Science Translational Medicine* **2016**, 325(8), p325ra17. DOI: 10.1126/scitranslmed.aad2355
13. **Strittmatter N** and Lovrics A, Sessler J, McKenzie JS, Kucsma N, Szakacs G, Takats Z. Shotgun Lipidomic Characterization of the NCI60 Cell Line Panel Using Rapid Evaporative Ionization Mass Spectrometry. *Analytical Chemistry* **2016**, 88 (15), 7507–751. DOI: 10.1021/acs.analchem.6b00187\*
14. Shariatgorji M and **Strittmatter N**, Nilsson A, Källback P, Alvarsson A, Zhang X, Vallianatou T, Svenningsson P, Goodwin RJA, Andren PE. Simultaneous imaging of multiple neurotransmitters and neuroactive substances in the brain by desorption electrospray ionization mass spectrometry. *NeuroImage* **2016**, 136, 129-138. DOI: 10.1016/j.neuroimage.2016.05.004\*
15. Abbassi-Ghadi N, Golf O, Kumar S, Antonowicz SSA, McKenzie JS, Huang J, **Strittmatter N**, Kudo H, Jones EA, Veselkov KA, Goldin RD, Hanna GB, Takats Z. Desorption Electrospray Ionization Mass Spectrometry Imaging of Esophageal Lymph Node Metastases. *Cancer Research* **2016**, 76(19), 5647-5656. DOI: 10.1158/0008-5472.CAN-16-0699
16. Dória ML, McKenzie JS, Mroz AK, Phelps DL, Speller AVM, Rosini F, **Strittmatter N**, Golf OH, Veselkov KA, Brown R, Ghaem-Maghani S, Takats Z. Epithelial ovarian carcinoma diagnosis by desorption electrospray ionization mass spectrometry imaging, *Scientific Reports* **2016**, 6, 39219. DOI: 10.1038/srep39219
17. England RM, Hare JI, Barnes J, Wilson J, Smith A, **Strittmatter N**, Kemmitt PD, Waring MJ, Barry ST, Alexander C, Ashford MB. Tumour regression and improved gastrointestinal tolerability from controlled release of SN-38 from novel polyoxazoline-modified dendrimers. *Journal of Controlled Release* **2017**, 247, 73–85. DOI: 10.1016/j.jconrel.2016.12.034
18. Hulme HE, Meikle LM, Wessel H, **Strittmatter N**, Swales J, Thomson C, Nilsson A, Nibbs RJB, Milling S, Andren PE, Mackay CL, Dexter A, Bunch J, Goodwin RJA, Burchmore R and Wall DM. Mass spectrometry imaging identifies palmitoylcarnitine as an immunological mediator during *Salmonella* Typhimurium infection. *Scientific Reports* **2017**, 7, 2786. DOI: 10.1038/s41598-017-03100-5
19. Galea D, Inglese P, Cammack L, **Strittmatter N**, Rebec M, Mirnezami R, Laponogov I, Kinross J, Nicholson JK, Takats Z & Veselkov KA. Translational utility of a hierarchical classification strategy in biomolecular data analytics. *Scientific Reports* **2017**, 7, 14981. DOI: 10.1038/s41598-017-14092-7
20. Swales JG, Dexter A, Hamm G, Nilsson A, **Strittmatter N**, Michopoulos F, Hardy C, Morentin-Gutierrez P, Mellor M, Andren PE, Clench MR, Bunch J, Critchlow SE, Goodwin RJA. Quantitation of endogenous metabolites in mouse tumors using mass-spectrometry imaging, *Analytical Chemistry* **2018**, 90(10), 6051-6058. DOI: 10.1021/acs.analchem.7b05239
21. Vallianatou T, **Strittmatter N**, Nilsson A, Shariatgorji M, Hamm G, Pereira M, Källback P, Svenningsson P, Karlgren M, Goodwin RJA, Andren P. A mass spectrometry imaging

approach for investigating how drug-drug interactions influence drug blood-brain barrier permeability. *Neuroimage* **2018**, 172, 808-816. DOI: 10.1016/j.neuroimage.2018.01.013

22. Bäckström E, Hamm G, Nilsson A, Fihn BM, **Strittmatter N**, Andrén P, Goodwin RJA, Fridén M. Uncovering the regional localization of inhaled salmeterol retention in the lung, *Drug Delivery* **2018**, 25(1), 838-845. DOI: 10.1080/10717544.2018.1455762
23. Varshavi D, Scott FH, Varshavi D, Veeravalli S, Phillips IR, Veselkov K, **Strittmatter N**, Takats Z, Shephard EA, Everett JR. Metabolic biomarkers of ageing in C57BL/6J wild-type and flavin-containing monooxygenase 5 (FMO5)-knockout mice. *Frontiers in Molecular Biosciences* **2018**, 5, 28. DOI: 10.3389/fmolb.2018.00028
24. Davison AS and **Strittmatter N**, Sutherland H, Hughes AT, Hughes J, Bou-Gharios G, Milan AM, Goodwin RJA, Ranganath LR, Gallagher JA. Assessing the effect of nitisinone induced hypertyrosinaemia on monoamine neurotransmitters in brain tissue from a murine model of alkaptonuria using mass spectrometry imaging. *Metabolomics* **2019**, 15(5):68. DOI: 10.1007/s11306-019-1531-4\*
25. Hulme H, Meikle LM, **Strittmatter N**, van der Hooft JJJ, Swales J, Bragg RA, Villar VH, Ormsby M, Barnes S, Brown SL, Dexter A, Kamat MT, Komen JC, Walker D, Milling S, Osterweil E, MacDonald AS, Schofield CJ, Tardito S, Bunch J, Douce G, Edgar JM, Edrada-Ebel R, Goodwin RJA, Burchmore R, Wall DM, Microbiome-derived carnitine mimics as novel mediators of gut-brain axis communication. *Science Advances* **2019** (under revision)
26. Colclough N, Chen K, Johnstroem P, **Strittmatter N**, Yan Y, Wrigley GL, Schou M, Goodwin RJA, Varnaes K, Adua SJ, Nguyen DX, Maglennon G, Atkinson J, Zhang L, Barton P, Janefeldt A, Wilson J, Smith A, Takano A, Arakawa R, Kondrashov M, Malmquist J, Revunov E, Vazquez-Romero A, Mahdi Moein M, Windhorst AD, Finlay MRV, Ward RA, Yates JWT, Smith PD, Farde L, Cheng Z, Cross DAE. Preclinical comparison of the blood brain barrier (BBB) permeability of osimertinib with other EGFR TKIs. *Clinical Cancer Research* **2019** (submitted)
27. Dannhorn A, Kazanc E, Ling S, Nikula C, Karali E, Serra MP, Vorng JL, Inglese P, Maglennon G, Hamm G, Swales J, Strittmatter N, Poulogiannis G, Bunch J, Goodwin RJA, Takats Z. Universal sample preparation unlocking multimodal molecular tissue imaging, *Nature Methods* **2019** (submitted)

\* Shared first authorship.

## Book Chapters

Takats Z, **Strittmatter N**, McKenzie JS. Advances in Cancer Research Volume 134, Applications of Mass Spectrometry Imaging to Cancer. Chapter 9: Ambient Mass Spectrometry in Cancer Research. Edited by Drake RR and McDonnell LA. 2017

## Podium presentations

---

1. **Strittmatter N**, Ling S, Maglennon G, Nilsson A, Andrén P, Paola Serra M, Hamm G, Wallez Y, Richards FM, Barry S, Jodrell DI, Lau A, Goodwin R. *Multimodal Mass Spectrometry Imaging to Understand Drug Delivery, Metabolism, Response And Resistance in Pancreatic Ductal Adenocarcinoma*. European Molecular Imaging Meeting 2019, Glasgow, UK (19-22 March 2019)
2. **Strittmatter N**, Kanvatirth P, Mastroeni P, Hamm G, Goodwin RJA. *Elucidating the effect of ciprofloxacin treatment for Salmonella enterica infection in an in vivo mouse*

- model*. 66<sup>th</sup> Conference of the American Society of Mass Spectrometry 2018 (ASMS), San Diego, CA, USA (June 3-7, 2018)
3. **Strittmatter N**, Bokobza S, Smith N, Goodwin RJA. *Detection of docetaxel and its distribution in prostate tumour xenografts by desorption electrospray ionisation mass spectrometry*. Imaging Mass Spectrometry Conference 2016 (OurConIV), Ustron, Poland (October 17-21, 2016)
  4. **Strittmatter N**, McKenzie J, Speller AVM, Burke A, Pruski P, Mirnezami R, Marchesi J, Rebec M, Takats Z. *Qualitative and quantitative detection of bacteria in complex human matrices using taxon-specific markers*. The International Chemical Congress of Pacific Basin Societies 2015 (PacifiChem 2015), Honolulu, Hawaii, USA (December 15-20, 2015)
  5. **Strittmatter N**, McKenzie J, Speller AVM, Burke A, Mirnezami R, Marchesi J, Rebec M, Takats Z. *Taxon-specific markers for the qualitative and quantitative detection of bacteria in human tissue samples*. 12<sup>th</sup> EMSG Ardgour Symposium 2015, Edinburgh, UK (November 16-20, 2015)
  6. **Strittmatter N**, Swales JG, Cobice D, Webborn P, Goodwin RJA. *Desorption Electrospray Ionisation Mass Spectrometry Imaging of pharmaceutical formulations in pre-clinical tumour models*. Imaging Mass Spectrometry Conference 2015 (OurConIII), Pisa, Italy (October 27-29, 2015)
  7. **Strittmatter N**, Goodwin RJA, Swales JG, Nilsson A, Andren PE, Takats Z, Ashton S, Jewsbury PJ, Pease E, Webborn P, Barry ST. *Analysis of nanoparticle-formulated anti-tumour drugs in preclinical models using multimodal mass spectrometry imaging*. Annual Conference of the British Mass Spectrometry Society (BMSS 2015), Birmingham, UK (September 15-17, 2015)
  8. **Strittmatter N**, McKenzie J, Burke A, Rickards T, Rebec M, Takats Z. *Taxon-specific markers for the qualitative and quantitative detection of bacteria in human samples*. Mass Spectrometry: Applications to the Clinical Lab Meeting 2015 (MSACL 2015 US), San Diego, CA, USA (March 28 - April 1, 2015)

*Young Investigator Travel Grant Awarded.*

9. **Strittmatter N**, Rebec M, Jones EA, Golf O, Abdolrasouli A, Balog J, Behrends V, Veselkov KA, Takats Z. *Rapid Characterization and Identification of Clinically Relevant Microorganisms Using Rapid Evaporative Ionization Mass Spectrometry*. Applications to the Clinical Lab Meeting 2014 (MSACL 2014 EU), Salzburg, Austria (September 2-5, 2014)

*Young Investigator Travel Grant Awarded.*

10. **Strittmatter N**, Lovrics A, Jones EA, Golf O, Veselkov KA, Szakacs G, Takats Z. *Characterisation of Human Cell Lines Using Rapid Evaporative Ionization Mass Spectrometry*. International Mass Spectrometry Conference 2014, Geneva, Switzerland (August 24-29, 2014)
11. **Strittmatter N**, Jones EA, Rebec M, Takats Z. *Identification of bacteria using rapid evaporative ionisation mass spectrometry*. 61<sup>st</sup> Conference of the American Society of Mass Spectrometry 2013 (ASMS), Minneapolis, MN, USA (June 9-13, 2013)
12. **Strittmatter N**, Takats Z. *From TFME-DESI MS to in-vivo analysis using REIMS: Applications of ambient mass spectrometry to biological samples*. 11<sup>th</sup> EMSG Ardgour Symposium 2014, Ardgour, UK (September 8-12, 2014)

## Suggested References

---

Janusz Pawliszyn

Theodore Alexandrov

Andrew Davison

John Swales

## **Additional Information**

---

Language Skills                      native German, fluent English, basic French, qualification in Latin.

Interests                                Reading, Painting, Sowing, Knitting, Photography, Travel