

# Dr. Jochem H. Smit

## Postdoctoral Researcher

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**Nationality**

Dutch

**Date of Birth**

23-09-1988

**Summary** My interest in mechanisms of physical law and biological machinery is what drives me to do research. I have a strong background in both Chemistry and Physics as well as programming proficiency which allows me to contribute to a broad range of interdisciplinary research projects.

## Postdoctoral Research

**2019–Present**

**Rega Institute for Medical Research**

*KU Leuven*

Protein folding, dynamics and secretion. My responsibilities are concerning the lab's biophysical toolbox: confocal smFRET, TIRF microscopy, and hydrogen-deuterium exchange mass spectrometry.

## Education

**2015–2019**

**Phd Researcher**

*University of Groningen*

PhD Thesis: Novel fluorescent probes and analysis methods for single-molecule and single-cell microscopy.

**2010–2012**

**MSc Nanoscience**

*University of Groningen*

Master Thesis: Organometallic Catalysis as seen by single molecule spectroscopy.

**2007–2010**

**BSc Physics**

*University of Groningen*

Bachelor Thesis: Synthesis of PTCDA derivatives and application of organic semiconductors in transistors. (shared thesis)

**2006–2011**

**BSc Chemistry**

*University of Groningen*

Bachelor Thesis: Synthesis of PTCDA derivatives and application of organic semiconductors in transistors. (shared thesis)

## Publications

**2024**

M. Stofella, A. Grimaldi, **J. H. Smit**, J. Claesen, E. Paci, F. Sobott, *Computational Tools for Hydrogen–Deuterium Exchange Mass Spectrometry Data Analysis*. Chemical Reviews, **124**, 12242–12263

**2022**

L. Zhang, M. Isselstein, J. Köhler, N. Eleftheriadis, N. M. Huijjes, M. Guirao-Ortiz, A. Narducci, **J. H. Smit**, J. Stoffels, H. Harz, H. Leonhardt, A. Herrmann, and T. Cordes, *Linker Molecules Convert Commercial Fluorophores into Tailored Functional Probes during Biolabelling*. Angewandte Chemie International Edition **61**, ee202112959

**2022**

D. Smets, A. Tsirigotaki, **J. H. Smit**, S. Krishnamurthy, A. G. Portalio, A. Vorobieva, W. Vranken, S. Karamanou, A. Economou, *Evolutionary adaptation of the protein folding pathway for secretability*. The EMBO Journal **41**, e111344

**2022**

D. Smets, **J.H. Smit**, Y. Xu, S. Karamanou, A. Economou, *Signal Peptide-rheostat Dynamics Delay Secretory Preprotein Folding*. Journal of Molecular Biology **434**, 167790

- 2022 S. Krishnamurthy, M.-F. Sardis, N. Eleftheriadis, K. E. Chatzi, **J. H. Smit**, K. Karathanou, G. Gouridis, A. G. Portaliou, A.-N. Bondar, S. Karamanou, and A. Economou, *Preproteins couple the intrinsic dynamics of SecA to its ATPase cycle to translocate via a catch and release mechanism*. Cell Reports **38**, 110346
- 2021 B. Yuan, A. G. Portaliou, R. Parakra, **J. H. Smit**, J. Wald, Y. Li, B. Srinivasu, M. S. Loos, H. S. Dhupar, D. Fahrenkamp, C. G. Kalodimos, F. Duong van Hoa, T. Cordes, S. Karamanou, T. C. Marlovits, A. Economou, *Structural Dynamics of the Functional Nonameric Type III Translocase Export Gate*. Journal of Molecular Biology **433**, 167188
- 2021 **J. H. Smit**, G. Roussel, and A. Economou, *Dynamics ante portas*. PNAS **118**, e2110553118
- 2021 **J. H. Smit**, S. Krishnamurthy, B. Y. Srinivasu, R. Parakra, S. Karamanou, A. Economou, *Probing Universal Protein Dynamics Using Hydrogen–Deuterium Exchange Mass Spectrometry-Derived Residue-Level Gibbs Free Energy*. Anal. Chem. **93**, 12840–12847
- 2021 S. Krishnamurthy, N. Eleftheriadis, K. Karathanou, **J. H. Smit**, A. G. Portaliou, K. E. Chatzi, S. Karamanou, A.-N. Bondar, G. Gouridis, A. Economou, *A nexus of intrinsic dynamics underlies translocase priming*. Structure **29**, 846-858
- 2019 **J. H. Smit**, Y. Li, E. M. Warszawik, A. Herrmann, and T. Cordes, *ColiCoords: A Python package for analysis of rod-shaped single-cell fluorescence microscopy data in Jupyter notebooks*. PLOS ONE **14**, e0217524
- 2019 **J. H. Smit**, J. H. M. van der Velde, J. Huang, V. Trauschke, S. Hendrikus, S. Chen, N. Eleftheriadis, E. M. Warszawik, C.M. Punter, A. Herrmann, T. Cordes, *On the impact of competing intra- and intermolecular triplet-state quenching on photobleaching and photoswitching kinetics of organic fluorophores*. PCCP, **21**, 3721-3733
- 2018 J. H. M. van der Velde\*, **J. H. Smit**\*, C.M. Punter, T. Cordes, *Self-healing dyes for super-resolution microscopy*. J. Phys. D: Appl. Phys, **52**, 034001
- 2018 E. M. Warszawik, **J. H. Smit**, Y. Li, M. Loznik, A. Paul, T. Cordes, A. Herrmann, *Uptake and Localization of Aminoglycoside Antibiotics in Live Escherichia Coli*. Biophysical Journal **114** (3), 629a
- 2017 J. Kim\*, **J. H. Smit**\*, D. K. Prusty, A. J. Musser, N. Tombros, P. C. W. Lee, A. Herrmann, M. Kwak, *Ultrasensitive Detection of Oligonucleotides: Single-Walled Carbon Nanotube Transistor Assembled by DNA Block Copolymer*. Journal of Nanoscience and Nanotechnology, **17** (8), 5175-5180
- 2016 J. H. M. van der Velde, J. Oelerich, J. Huang, **J. H. Smit**, A. A. Jazi, S. Galiani, K.I Kolmakov, G. Guoridis, C. Eggeling, A. Herrmann, G. Roelfes, T. Cordes, *A simple and versatile design concept for fluorophore derivatives with intramolecular photostabilization*. Nature Communications, **7**, 10144

- 2014** J. H. M. van der Velde, J. Oelerich, J. Huang, **J. H. Smit**, M. Hiermaier, E. Ploetz, A. Herrmann, G. Roelfes, T. Cordes, *The power of two: covalent coupling of photostabilizers for fluorescence applications*. JPC Letters, **5** (21), 3792-3798
- 2012** I. Stein, S. Capone, **J.H. Smit**, F. Baumann, T. Cordes, P. Tinnefeld, *Linking Single-Molecule Blinking to Chromophore Structure and Redox Potentials*. ChemPhysChem, **13**, 931-937





## Research Experience

- 2013** **Research Assistant** *LMU Munich*  
Supervisor: Prof. Dr. Wolfgang Zinth  
Keywords: *Ultrafast Spectroscopy, Streak Camera, Time-resolved Fluorescence, Non-linear Optics*
- 2012** **Research Assistant** *University of Groningen*  
Supervisor: Prof. Dr. T. Cordes  
Keywords: *Single-molecule Chemistry, Fluorescence Microscopy, Organopalladium Chemistry*
- 2011** **Internship** *LMU Munich*  
Supervisor: Prof. Dr. P. Tinnefeld  
Keywords: *Confocal Microscopy, Photophysics, Single-molecule Studies, Redox Chemistry*
- 2011** **Internship** *University of Groningen*  
Supervisor: Prof. Dr. A. Herrmann  
Keywords: *Graphene, Carbon Nanotubes, Organic Electronics, DNA Hybrid Materials, DNA Synthesis*

## Teaching

- 2023** **Hot topics in Microbiology** *KU Leuven*  
2hr lecture on single-molecule fluorescence microscopy for microbiology students
- 2015–2016** **T.A. Thermodynamics** *University of Groningen*  
Teaching of exercise classes Thermodynamics for 1st year physics students

## Software Development

- 2025** **InstaGibbs**  
Real-time residue-level Gibbs free energies coupled to a HDX-MS database
- 2023** **Don't FRET**   
Web application for analysis of confocal smFRET data.
- 2022** **slimfit**   
Fitting library; Expectation-Maximization maximum likelihood fitting.
- 2019** **PyHDX**   
Interactive web server for analysis of HDX-MS data to obtain residue-level Gibbs free energy of exchange.
- 2019** **ColiCoords**   
Jupyter-notebooks based tool for identification and alignment of bacterial cells for fluorescence microscopy.

## Conferences

- 2022** **GRC Single Molecule Approaches to Biology** *Barcelona*  
 Poster Presentation: *Probing Universal Protein Dynamics Using Hydrogen-Deuterium Exchange Mass Spectrometry-Derived Residue-Level Gibbs Free Energy*
- 2022** **HDXMS2022** *London*  
 Oral Presentation: *Probing Universal Protein Dynamics Using Hydrogen-Deuterium Exchange Mass Spectrometry-Derived Residue-Level Gibbs Free Energy*
- 2021** **Membrane protein biophysics** *Namur*  
 Poster Presentation: *PyHDX: Probing Universal Protein Dynamics Using Hydrogen-Deuterium Exchange Mass Spectrometry-Derived Residue-Level Gibbs Free Energy*
- 2018** **Bacterial Protein Export** *Leuven*  
 Poster Presentation: *Uptake and Localization of Aminoglycoside Antibiotics in Live Escherichia Coli*
- 2018** **PicoQuant Workshop** *Berlin*  
 Oral Presentation: *Inter- vs intramolecular photostabilization of organic fluorophores*
- 2018** **84th Harden Conference: Single-molecule bacteriology** *Oxford*  
 Oral Presentation: *Uptake and Localization of Aminoglycoside Antibiotics in Live Escherichia Coli*
- 2017** **Zernike Institute for Advanced Materials meeting** *Vlieland*  
 Oral Presentation: *Inter- vs Intramolecular photostabilization of organic fluorophores*
- 2016** **Dutch BioPhysics** *Veldhoven*  
 Poster Presentation: *Design of photostabilizer-dye conjugates and applications in super-resolution microscopy*
- 2015** **PicoQuant Workshop** *Berlin*  
 Poster Presentation: *The Power of Two: Covalent Coupling of Photostabilizers for Fluorescence Applications*
- 2015** **Focus on Microscopy** *Goettingen*  
 Oral Presentation: *A Simple And Versatile Synthesis Strategy For Intramolecular Photostabilization of Organic Fluorophores*

## Fellowships and awards

- 2020** **KU Leuven**  
 Postdoctoral Mandate (1 year)
- 2018** **FEMS**  
 Fellowship for attending BPE2018 conference
- 2010–2012** **Zernike Insitute for Advanced Materials**  
 Fellowship for TopMaster programme in Nanoscience