



**HOLLAND RESEARCH SCHOOL
OF MOLECULAR CHEMISTRY**

**ANNUAL
REPORT
2025**



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General

This annual report presents an overview of the research and educational activities of the graduate research school 'Holland Research School of Molecular Chemistry' (HRSMC) during 2025. The University of Amsterdam legally represents the HRSMC. The research school was founded in 1994 and has been re-accredited by the Royal Netherlands Academy of Arts and Sciences (KNAW) in 1999, 2005 and 2012. The HRSMC is a collaboration between top research groups of four Dutch Universities: the University of Amsterdam (UvA), the VU University Amsterdam (VU), Leiden University (UL) and the Radboud University (RU).

The HRSMC harbours a powerhouse of expertise in Synthetic, Physical, and Theoretical Chemistry as well as Spectroscopy and Molecular Physics. This multidisciplinary character makes the School unique in the Netherlands and abroad; it allows it to operate in a broad field that addresses fundamental scientific problems but also challenges society currently faces in areas like sustainability, energy, and health.

This annual report presents a survey of the activities and achievements of the HRSMC, both educational and scientific, as well as the scientific achievements of the participating research groups.

As an interuniversity research school, the HRSMC has two main targets:

- (A) to promote and facilitate research aimed at the three HRSMC research themes: (1) 'Synthesis, Characterisation, Properties and Reactivity of Molecules', (2) 'Physical Chemistry and Spectroscopy' and (3) 'Theoretical Chemistry'. The HRSMC board strives for coherence in the research activities of its members by promoting collaboration between the research groups and safeguarding complementarities with respect to infrastructure and expertise.
- (B) to facilitate and provide a coherent, high-level educational programme to its PhD students, which offers a seamless connection to the Master degree programme. The primary aim is to teach PhD researchers to answer key questions in molecular science and to use their insights in a multidisciplinary approach.

The extensive educational programme (Schools, Courses and Symposia) offered by the HRSMC means that for all practical purposes the school takes care of the educational program of its PhD students and safeguards their progress. Importantly, the educational activities of the HRSMC are also accessible for (advanced) MSc students and thereby seamlessly connect to the undergraduate programs of the participating universities.

Besides organising several educational activities, the HRSMC organised two application rounds within the Fellowship and PhD Mobility Programme.

Prof. dr. Wybren Jan Buma

Scientific Director of the HRSMC

The Research Programme

The research program of the HRSMC is embedded in top research groups of the VU Amsterdam (VU), the University of Amsterdam (UvA), Leiden University (UL) and the Radboud University (RU). It is organized around three different research themes in molecular chemistry which complement and mutually reinforce each other.

Theme 1: Synthesis, Characterisation, Reactivity and Properties of Molecules

This theme deals, among others, with the design, synthesis and characterization of new compounds, the development of new (bio)catalytic reactions, and the investigation of their mechanisms.



Theme 2: Physical Chemistry and Spectroscopy

Theme 2 addresses the issue of experimentally uncovering the fundamental factors behind molecular properties through the interaction between light and molecular matter. Advanced spectroscopic techniques are employed to probe and utilize fundamental processes such as catalytic events, reaction mechanisms and dynamics, and energy and electron transfer.



Theme 3: Theoretical Chemistry

Research within this theme is fully dedicated to understanding the structure of molecules and their chemistry from first principles. HRSMC's theoretical chemistry groups cover method and software development, computational chemistry, and the development of models and guiding principles for rational design of catalysts and sustainable processes. They are working on a broad range of time and length scales (atomic, molecular, supra-molecular, condensed-phase/membrane processes), naturally leading to a multi-scale approach of fundamental and applied theoretical chemistry.



Overview of the Research Groups in 2025

HRSMC Members

The research program of the HRSMC is embedded in top research groups of the VU Amsterdam (VU), the University of Amsterdam (UvA), Leiden University (UL) and Radboud University (RU). The following table gives an overview of the research groups involved in the HRSMC in December 2025:

Theme	Group (University, Institute) and Staff members
1	Homogeneous, Supramolecular and Bio-Inspired Catalysis (UvA, HIMS) Prof. dr. B. de Bruin, Prof. dr. J.N.H. Reek, Prof. dr. C.J. Elsevier, Dr. A.W. Ehlers, Dr. Ir. J.I. van der Vlugt (guest appointment), Dr. S. Pullen, Dr. B. Baumgartner
	Functional Materials (UvA, HIMS) Dr. S. Grecea
	Heterogeneous Catalysis and Sustainable Chemistry (UvA, HIMS) Prof. dr. G. Rothenberg, Dr. A. Garcia
	Catalysis Engineering (UvA, HIMS) Dr. N.R. Shiju
	Synthetic Organic Chemistry (UvA, HIMS) Prof. dr. J.H. van Maarseveen, Dr. M.Á. Fernández-Ibáñez, Prof. dr. J.C. Sootweg, Dr. S. Ingemann
	Biocatalysis (UvA, HIMS) Prof. dr. F. Mutti
	Flow Chemistry (UvA/HIMS) Prof. dr. T. Noël
	Industrial Sustainable Chemistry (UvA/HIMS) Prof. dr. G.J.M. Gruter
	Biomimetic and Biomolecular Chemistry (VU, AIMMS) Prof. dr. T. Grossmann, Dr. S. Hennig, Dr. I. Drienovská
	Synthetic Organic Chemistry & Catalysis (VU, AIMMS) Prof. dr. E. Ruijter, Dr. T. Hansen
	Chemical Biology and Biotechnology (VU/AIMMS) Dr. S.A.K. Jonkees
	Metals in Catalysis, Biomimetics & Inorganic Materials (UL, LIC)

	Prof. dr. E. Bouwman, Prof. dr. S. Bonnet, Dr. D.G.H. Hetterscheid Bio-organic Synthesis (UL/LIC) Prof. dr. J.D.C. Codée, Dr. S.J. Wezenberg Synthetic Organic Chemistry (RU/IMM) Prof. dr. F.P.T.J. Rutjes, Dr. T.J. Boltje
2	Molecular Photonics (UvA, HIMS) Prof. dr. A.M. Brouwer, Prof. dr. W.J. Buma, Prof. dr. S. Woutersen, Prof. dr. T. Šolomek, Dr. ir. A. Petrignani, Dr. R. M. Williams, Dr. H. Zhang Chemistry for Art Conservation (UvA, HIMS) Prof. dr. K. Keune, Dr. J.J. Hermans Biophotonics and Medical Imaging (VU, LaserLaB) Dr. F. Ariese Cellular Metabolism (VU/AIMMS) Dr. S. Moco BioAnalytical Chemistry (VU, AIMMS) Prof. dr. A.M. Rijs, Dr. M. Bärenfänger PhotoConversion Materials (VU) Prof. dr. E.L. von Hauff, Dr. C. Ramanan, Dr. A. Baldi, Dr. S. Askes, Dr. L.A. Muscarella Biophysical Organic Chemistry (UL, LIC) Prof. dr. H.J.M. de Groot, Dr. Alia, Dr. F. Buda, Dr. G.J.A. Sevink Molecular Nano-Optics and Spins (UL, LION) Prof. dr. E.J.J. Groenen, Dr. P. Gast, Dr. M. I. Huber Surface Chemistry and Catalysis (UL, LIC) Prof. dr. M. Koper, Dr. W.T. Fu, Dr. I.M.N. Groot, Dr. D.G.H. Hetterscheid, Dr. R.V. Mom, Dr. J.J. Geuchies Bioelectrochemistry and Biocatalysis (UL, LIC) Prof. dr. L.J.C. Jeuken Laboratory Astrophysics and Astrochemistry (UL, STRW) Dr. K.-J. Chuang FELIX Laboratory (RU)

	Prof. dr. J. Oomens, Dr. J.M. Bakker, Dr. S. Brünken, Prof. dr. W.J. Buma (extraordinary professor) Spectroscopy and Catalysis (RU) Prof. dr. J. Roithova
3	Computational Chemistry (UvA, HIMS) Prof. dr. P.G. Bolhuis, Prof. dr. E.J. Meijer, Dr. B. Ensing, Dr. D. Dubbeldam, Dr. J. Vreede, Dr. I.M. Ilie, Dr. A. Pérez de Alba Ortíz Theoretical Chemistry (VU, EMS) Prof. dr. F.M. Bickelhaupt, Prof. dr. L. Visscher, Prof. dr. C. Fonseca Guerra, Dr. K. J. H. Giesbertz, Dr. T.A. Hamlin, Dr. P. Vermeeren, Dr. A. Förster Biomolecular Simulation and Modeling (VU, EMS) Dr. D.P. Geerke Theoretical Chemistry (UL, LIC Energy & Sustainability) Prof. dr. G. J. Kroes, Dr. J. Meyer, Dr. M.F. Somers, Dr. A.L.M. Lamberts Theory in Surface science and electrochemistry (UL, LIC) Dr. Katharina Doblhoff-Dier Theoretical Chemistry (RU) Prof. dr. ir. G.C. Groenenboom, Prof. dr. H.M. Cuppen, Prof. dr. F.M. Bickelhaupt (extraordinary professor) Astrochemistry (UvA/API) Dr. A. Candian

Research and Education

HRSMC Course ‘Understanding Molecular Simulation’, Molsim 2025

6-17 January 2025, University of Amsterdam

A total of 69 participants: 5 PhD students from TU Delft, 2 PhD student from TUE, 1 PhD student from Vrije Universiteit Amsterdam, and 61 participants came from foreign universities.

The invited lecturers were: Daan Frenkel (University of Cambridge, UK), Berend Smit (EPFL, CH), Peter Bolhuis (University of Amsterdam), Bernd Ensing (University of Amsterdam), Evert Jan Meijer (University of Amsterdam), David Dubbeldam (University of Amsterdam), Ioana Ilie (University of Amsterdam), Jocelyne Vreede (University of Amsterdam).

Organisers: Evert Jan Meijer (University of Amsterdam), Berend Smit (EPFL), Daan Frenkel (University of Cambridge), David Dubbeldam (University of Amsterdam), Laura Bastiaans-Tomé (University of Amsterdam), Christina Santaka (University of Amsterdam).

HRSMC Course ‘Physical Methods in Inorganic Chemistry’

January 20 – 30, 2025, University of Amsterdam, Leiden University, Vrije University Amsterdam

A total of 22 participants attended this course. 17 PhD students (VU: 1, UvA: 8, TUD: 2, LU: 6), and 2 HRSMC Class of Excellence students.

Organisers: Dr. Dennis Hetterscheid (UL, chair), Prof. dr. Sylvestre Bonnet (UL), Prof. dr. Bas de Bruin (UvA), Dr. Rachel Scheffelaar (UvA, HRSMC), Laura Bastiaans (UvA, HRSMC) and Christina Santaka (UvA, HRSMC)

HRSMC Course ‘Targeted Synthesis Challenges’

May 7, 2025, Vrije University Amsterdam

A total of 25 participants attended this course, of which 10 PhD students (VU: 6, UvA: 4), 12 MSc students, and 3 Postdocs (VU: 1, UvA: 2).

Organisers: Prof. dr. Eelco Ruijter (Vrije University Amsterdam), Prof. dr. Jan van Maarseveen (University of Amsterdam), Rachel Scheffelaar (University of Amsterdam, HRSMC), Laura Bastiaans (University of Amsterdam, HRSMC) and Christina Santaka (University of Amsterdam, HRSMC).

HRSMC Course ‘High Impact Writing’

June 4 – 12, 2025, Leiden University

A total of 34 participants (UvA: 14, UL: 14, VU: 1, Industry: 5)

Organisers: Prof. dr. U. Muller (Department of Biology /California State University Fresno) and Dr. O. Berg (Department of Chemistry and Biochemistry/ California State University Fresno).

Synthesis Summer School 2025

July 7-10, 2025, Deurne, The Netherlands

A total of 45 people attended the school.

Invited lecturers: Prof. Tjeerd Barf (Artica Therapeutics & Covalution BioSciences), Peter Buijnsters (J&J Innovative Medicine); José Luis Mascareñas (Ciqus, Santiago de la Compastella); Bill Morandi (ETH Zürich); Cristina Nevado (University of Zürich); Corinna Schindler (The University of British Columbia); Armido Studer (Münster University); Siegfried Waldvogel (Max Planck Institute).

Organisers:

Prof. dr. Eelco Ruijter (Vrije University Amsterdam), Jan van Maarseveen (University of Amsterdam), Tati Fernández Ibáñez (University of Amsterdam), Thomas Hansen (Vrije University Amsterdam), Laura Bastiaans-Tomé (University of Amsterdam, HRSMC), Christina Santaka (University of Amsterdam, HRSMC), Rachel Scheffelaar (University of Amsterdam, HRSMC).

HRSMC Course 'Targeted Synthesis Challenges'

November 5, 2025, University of Amsterdam

A total of 28 participants attended this course, of which 9 PhD students (VU: 3, UvA: 6), 15 MSc students and 2 postdocs (VU:1, UvA: 1).

Organisers: Prof. dr. Jan van Maarseveen (UvA), Prof. dr. Eelco Ruijter (VU), Rachel Scheffelaar (UvA, HRSMC), Laura Bastiaans (UvA, HRSMC) and Christina Santaka (UvA, HRSMC)

HRSMC Symposium 2025

November 21, 2025, CWI Amsterdam

A total of 144 people attended the symposium.

Guest lecturer: Prof. dr. Annemie Bogaerts (University of Antwerp).

HRSMC staff lecturers:

- Dr. Sander Wezenberg (Leiden University) – Theme 1
- Prof. dr. Anouk Rijs (VU Amsterdam) – Theme 2
- Dr. Ir. Ioana Ilie (University of Amsterdam) – Theme 3

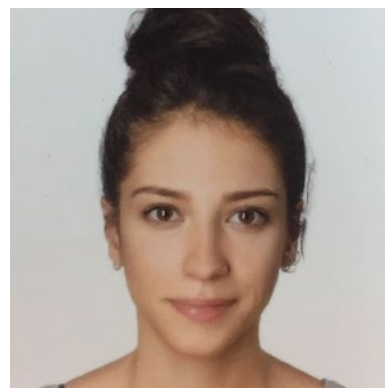
PhD lecturers:

- Anju Rajamohanan Sobhana (University of Amsterdam)
- Frank de Kleijne (Radboud University)
- Kees Kolmeijer (Leiden University)
- Sander van Lith (University of Amsterdam)
- Lukas Hückmann (Leiden University)
- Mariia Sapova (VU Amsterdam)

The Dick Stufkens Prize 2025

The Dick Stufkens Prize 2025 for best PhD thesis of the Holland Research School of Molecular Chemistry (HRSMC) has been awarded to Dr Begüm Demirkurt for her thesis “Mechanical Contact Imaging using Fluorescence Techniques”. Demirkurt, who obtained her doctorate from the University of Amsterdam last March, will receive the prize during the annual HRSMC symposium to be held on 21 November 2025 at the Amsterdam Science Park Conference Centre.

In her thesis, Demirkurt describes the development and use of fluorescence microscopy techniques to visualise, with nanometre resolution, the real contact area between rough surfaces. The method is based on the fluorescence of a rotor molecule and exploits its sensitivity to the viscosity or rigidity of the local microenvironment at the interface.



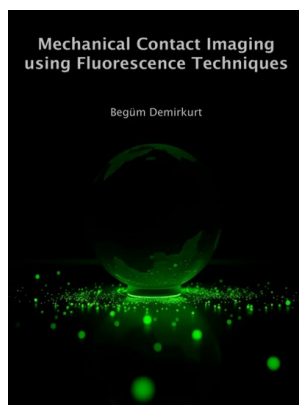
Dr Begüm Demirkurt. Photo: UvA.

Selecting the winner, the jury for the Dick Stufkens prize 2025 unanimously decided for Demirkurt. The jury is impressed by the quality of her research and the width of her approach, combining molecular sensing and contact mechanics. The jury particularly appreciates the depth of her understanding, as appears from her bright discussions of the scientific results.

The thesis of Demirkurt reveals her skills in surface chemistry, optical spectroscopy and microscopy, atomic-force microscopy, surface profilometry, and computer modelling of surface structure using contact-mechanics software. In her hands, the combination of results from these diverse fields made for a highly successful research project. Adding to this, her thesis is well written, and the instructive schemes and clear figures testify to her great presentation skills. Begüm Demirkurt is a versatile scientist who fully deserves the Dick Stufkens Prize.

Mechanical contact imaging with high resolution

At the heart of Demirkurt’s experimental research is a sensor consisting of a monolayer of fluorescent molecular-rotor molecules that are covalently linked to a silane functionalized glass cover slip. A glass or polymer sphere, glued to the head of a rheometer, is then pressed onto the glass cover slip by applying a controlled normal force. At the same time, the contact interface is imaged from below using a fluorescence microscope. While the fluorescence is weak in the absence of mechanical contact, it strongly increases when the probe molecules become confined. This thus enables imaging of the actual contact area in unprecedented detail.



In her thesis, Demirkurt explores the resolution that can be achieved using the described fluorescence imaging setup. She studies the photophysics of the rotor molecule in great detail to obtain a fundamental understanding of its fluorescence behaviour in diverse environments.

In the first part of her thesis, Demirkurt reports an ingenious method to turn the sensor into a single-molecule detector. Prolonged irradiation of the monolayer with intense continuous-wave laser light at 488 nm turns a large part of the fluorescent molecules into a dark state, only leaving a set of blinking molecules that can be observed one by one. This blinking phenomenon enables imaging the contact interface with a resolution of

just under 60 nm, allowing the study of both soft (plastics) and hard (glass) contacts. This impressive resolution turns out to be instrumental for determining the real contact area of the glass sphere, as the contact is restricted to the discrete, nanoscopic irregularities of the rough surface. This highlight of Demirkurt's research was published in 'The Journal of Physical Chemistry Letters', a prestigious journal in her field.

Following this unique result, Demirkurt presents a broad range of mechanistic studies, which aim at the understanding of the fluorescence characteristics of the rotor molecule at ensemble and single-molecule levels, across a variety of contact interfaces and solid-state environments. She concludes that most likely the photogenerated dark intermediate is a radical anion, which returns to the fluorescent neutral state by charge recombination. In a beautiful series of time-resolved experiments, Demirkurt shows the dependence of the blinking dynamics on the dielectric properties of the interface, the molecular confinement and the rotor density in the monolayer. This insight into the behaviour of the molecular rotor in diverse environments is essential to further refining the super-resolution technique. Subsequently, she applies this technique to study the effect of surface roughness on contacts and friction between two hard glass objects, taking the resolution down to 30 nm.

In the last chapter of her thesis, Demirkurt reports the sensitivity of the rotor-on-glass sensor in contact detection at the interfaces of soft polymers and hard glass. The study shows that the sensor primarily responds to changes in free volume, and much less to the pressure inside a contact. High-pressure experiments with the contact liquid DMSO point to the presence of a thin DMSO layer in the interface that most probably solidifies, thereby reducing the sensitivity of the sensor to pressure changes. This observation underscores that the rotor-on-glass sensor is best suited as on/off contact detector.

The thesis can be accessed in detail [at the UvA Digital Academic Repository](#).

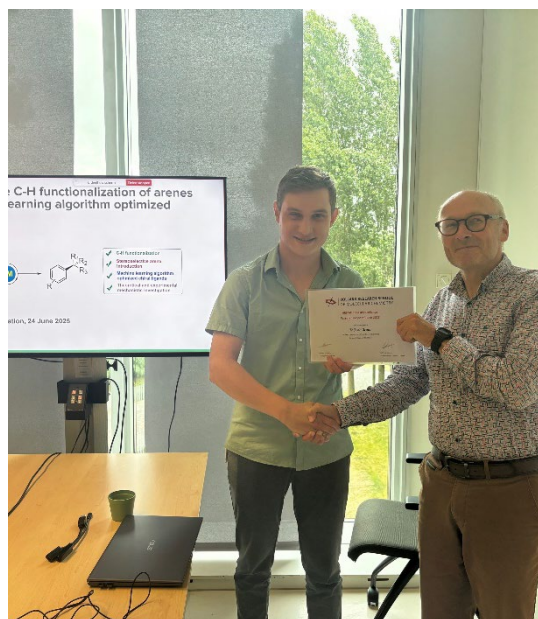
HRSMC Class of Excellence

In September 2025 five (6) students started the HRSMC Class of Excellence. Three students obtained the certificate this year after successfully graduating from the programme.

Class of Excellence Pitch Prize 2025

On June 24, 2025 Thijs de Groot has defended his research proposal for a jury of HRSMC staff members and a member of the external advisory committee of the HRSMC. The research proposal is an obligatory part of the [HRSMC Class of Excellence](#), a programme for excellent chemistry master students. The jury was very much impressed with his presentation and the subsequent discussion with the jury members, and therefore decided to award him with the HRSMC Class of Excellence Pitch Prize.

The prize consists of a certificate and € 1500,- (for a contribution) to attend a conference or a course/training or € 450,- free to spend.



PhD Theses

Listed here are PhD theses with HRSMC group leaders as supervisor and/or co-supervisor. In 2025 seven HRSMC PhD certificates were awarded.

University of Amsterdam

1/8/2025

Photocatalytic strategies for the valorization of feedstock chemicals in batch and flow

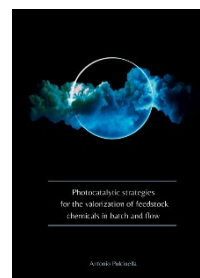
Author: A (Antonio) Pulcinella

Supervisor: T. Noël

Co-supervisor:

Group: Flow Chemistry

Link: [Read or download this thesis](#)



1/24/2025

From Dusk till Dawn: A Chemical Journey of Valorising Biorefinery Sugars

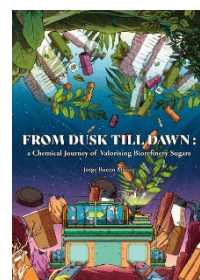
Author: J. (Jorge) Bueno Morón

Supervisor: G.J.M. Gruter

Co-supervisor:

Group: Industrial Sustainable Chemistry

Link: [Read or download this thesis](#)



1/27/2025

Light-Driven CO₂ Reduction in Metal-Organic Frameworks|Strategies for Catalyst Immobilization

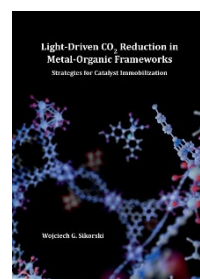
Author: W.G. (Wojciech) Sikorski

Supervisor: J.N.H. Reek, J.I. van der Vlugt

Co-supervisor: S. Grecea

Group: Homogeneous, Supramolecular and Bio-Inspired Catalysis

Link: [Read or download this thesis](#)



2/6/2025

Unlocking Palladium Catalysis: S,O-Ligand-Promoted C–H Functionalization of Arenes

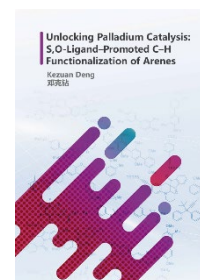
Author: K. (Kezuan) Deng

Supervisor: M.Á. Fernández Ibáñez

Co-supervisor: F. Mutti

Group: Synthetic Organic Chemistry

Link: [Read or download this thesis](#)



2/14/2025

Transport and behaviour of water in oil paintings

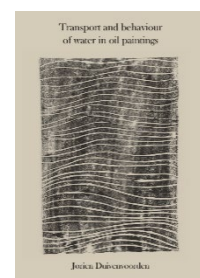
Author: J.R. (Jorien) Duivenvoorden

Supervisor: K. Keune

Co-supervisor: J.J. Hermans

Group: Chemistry for Art Conservation

Link: [Read or download this thesis](#)



2/26/2025

Designing multifunctional enzymatic devices for biosensing and chemical conversion

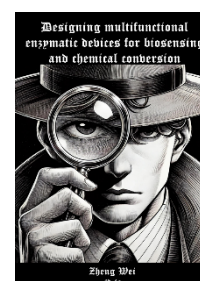
Author: Z. (Zheng) Wei

Supervisor: F. Mutti, G. Rothenberg

Co-supervisor: N. Yan

Group: Biocatalysis

Link: [Read or download this thesis](#)



2/27/2025

Merging polar chemistry and photocatalysis: a multistep approach to enhance the sp³ fraction in organic molecules

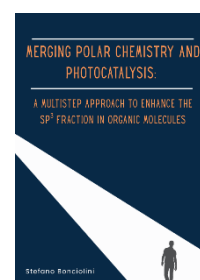
Author: S. (Stefano) Bonciolini

Supervisor: T. Noël

Co-supervisor: J.H. van Maarseveen

Group: Flow Chemistry

Link: [Read or download this thesis](#)



3/3/2025

Mechanical Contact Imaging using Fluorescence Techniques

Author: B. (Begüm) Demirkurt

Supervisor: A.M. Brouwer

Co-supervisor:

Group: Molecular Photonics

Link: [Read or download this thesis](#)



3/12/2025

Supramolecular strategies for the templated synthesis of confined nanoparticles and their application in catalysis

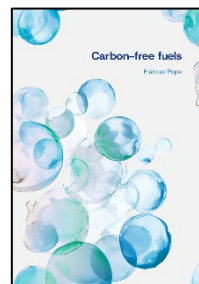
Author: F.A. (Frances) Pope

Supervisor: G. Rothenberg, A.C. Garcia

Co-supervisor:

Group: Heterogeneous Catalysis and Sustainable Chemistry

Link: [Read or download this thesis](#)



3/18/2025

Self driving labs for the optimization of photochemical processes

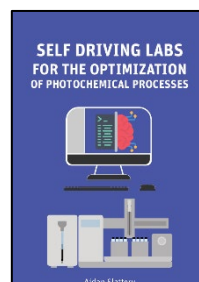
Author: A. (Aidan) Slattery

Supervisor: T. Noël

Co-supervisor:

Group: Flow Chemistry

Link: [Read or download this thesis](#)



3/19/2025

Probing Interfaces and surfaces with molecular fluorescence

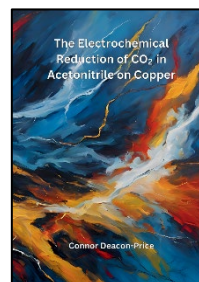
Author: C. (Connor) Deacon-Price

Supervisor: G. Rothenberg

Co-supervisor: A.C. Garcia

Group: Heterogeneous Catalysis and Sustainable Chemistry

Link: [Read or download this thesis](#)



3/21/2025

Underneath the surfaceAdvanced synchrotron techniques for the study of oil paint in three dimensions

Author: F. (Frédérique) Broers

Supervisor: K. Keune

Co-supervisor:

Group: Chemistry for Art Conservation

Link: [Read or download this thesis](#)



5/21/2025

Emulating Natural Photosynthesis|Self-Assembled Cage Scaffolds to Control Molecular Aggregation States

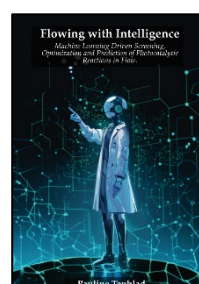
Author: P. (Pauline) Tenblad

Supervisor: T. Noël

Co-supervisor:

Group: Flow Chemistry

Link: [Read or download this thesis](#)



6/4/2025

Mechanistic Insights into Energy Transfer in Highly Doped Upconversion Nanoparticles

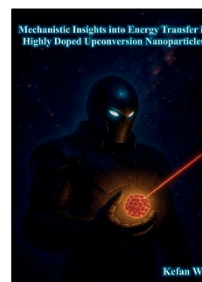
Author: K. (Kefan) Wu

Supervisor: H. Zhang

Co-supervisor: W.J. Buma

Group: Molecular Photonics

Link: [Read or download this thesis](#)



6/12/2025

**Tracing the artist's intent
Combining micro- and macroscopic analysis with art technological sources to study 17th-century paintings**

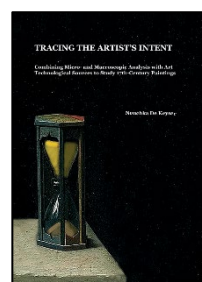
Author: N. (Nouchka) de Keyser

Supervisor: K. Keune

Co-supervisor:

Group: Chemistry for Art Conservation

Link: [Read or download this thesis](#)



6/17/2025

**Molecular containers
Macrocycles, cages and photocages**

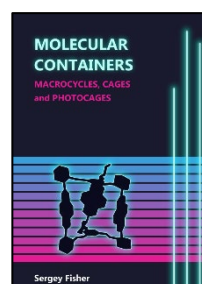
Author: S. (Sergey) Fisher

Supervisor: J.C. Slootweg

Co-supervisor: T. Šolomek

Group: Synthetic Organic Chemistry

Link: [Read or download this thesis](#)



9/3/2025

**Closing the phosphorus loop
Recovery, recycling and sustainable design**

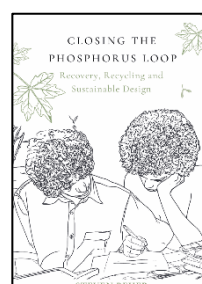
Author: S. (Steven) Beijer

Supervisor: J.C. Slootweg

Co-supervisor: J.H. van Maarseveen

Group: Synthetic Organic Chemistry

Link: [Read or download this thesis](#)

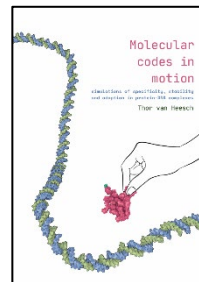


9/5/2025

Molecular codes in motion
Simulations of specificity, stability, and structural adaptation
in protein-DNA complexes

Author: T. (Thor) van Heesch
Supervisor: P.G. Bolhuis
Co-supervisor: J. Vreede
Group: Computational Chemistry

Link: [Read or download this thesis](#)



9/9/2025

Hybrid luminescent systems based on rare-earth-doped
upconversion nanoparticles
Mechanisms and wide range temperature sensing

Author: J. (Jun) Yuan
Supervisor: H. Zhang
Co-supervisor: W.J. Buma
Group: Molecular Photonics

Link: [Read or download this thesis](#)

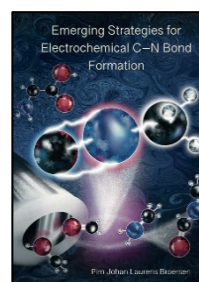


9/16/2025

Emerging strategies for electrochemical C-N bond formation

Author: P.J.L. (Pim) Broersen
Supervisor: G. Rothenberg
Co-supervisor: A.C. Garcia
Group: Heterogeneous Catalysis and Sustainable Chemistry

Link: [Read or download this thesis](#)

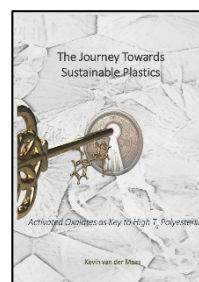


10/8/2025

The Journey Towards Sustainable Plastics|Activated
Oxalates As Key to High Tg Polyesters

Author: K. (Kevin) van der Maas
Supervisor: G.J.M. Gruter
Co-supervisor:
Group: Industrial Sustainable Chemistry

Link: [Read or download this thesis](#)

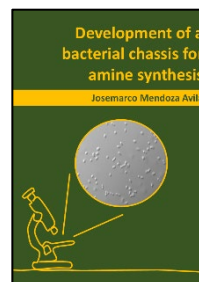


10/9/2025

Development of a bacterial chassis for amine synthesis

Author: J. (Josemarco) Mendoza Avila
Supervisor: F. Mutti
Co-supervisor:
Group: Biocatalysis

Link: [Read or download this thesis](#)



10/24/2025

Exploring the Chemical Interactions of Lead(II)Oxide and Linseed Oil in Historical and Model Paint Systems Using Laboratory and Safe Synchrotron Radiation Analyses

Author: I. (Ida) Fazlić

Supervisor: K. Keune

Co-supervisor:

Group: Chemistry for Art Conservation

Link: [Read or download this thesis](#)



11/6/2025

Ruthenium-catalysed atom transfer radical addition | A radical approach to chloroalkane valorisation

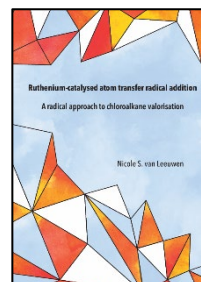
Author: N.S. (Nicole) van Leeuwen

Supervisor: B. de Bruin

Co-supervisor: S. Pullen

Group: Homogeneous, Supramolecular and Bio-Inspired Catalysis

Link: [Read or download this thesis](#)



2/4/2025

Taming amyloid oligomers: Developing analytical approaches to investigate peptide aggregation

Author: I. (Iuliia) Stroganova

Supervisor: A. Rijs

Co-supervisor:

Group: BioAnalytical Chemistry

Link: [Read or download this thesis](#)



5/7/2025

Quantum algorithms for electronic structure beyond ground state energies

Author: E.F. (Emiel) Koridon

Supervisor: L. Visscher, F. Buda

Co-supervisor:

Group: Theoretical Chemistry

Link: [Read or download this thesis](#)



5/8/2025

Exploring Bioconjugation and Bioorthogonal Strategies via Computational Chemistry

Author: S.E. (Steven) Beutick

Supervisor: F.M. Bickelhaupt

Co-supervisor: T. Hamlin

Group: Theoretical Chemistry

Link: [Read or download this thesis](#)



10/23/2025

New Dimensions in Raman Microspectroscopy

Author: R.W. (Robert) Schmidt

Supervisor: F. Ariese, S. Woutersen

Co-supervisor:

Group: Biophotonics and Medical Imaging

Link: [Read or download this thesis](#)



12/5/2025

Computational Sustainable Catalysis

Author: E.H. (Eveline) Tiekink

Supervisor: F.M. Bickelhaupt

Co-supervisor: T. Hamlin

Group: Theoretical Chemistry

Link: [Read or download this thesis](#)



12/8/2025

Correlation Energy and Exact Exchange for Periodic Systems with Numerical Atomic Orbitals

Author: E. (Edoardo) Spadetto

Supervisor: L. Visscher

Co-supervisor: A. Förster

Group: Theoretical Chemistry

Link: [Read or download this thesis](#)



12/9/2025

A versatile Raman setup: with time-gating and fast widefield imaging capabilities

Author: B.J.A. (Bram) Mooij

Supervisor: F. Ariese

Co-supervisor:

Group: Biophotonics and Medical Imaging

Link: [Read or download this thesis](#)



1/14/2025

Porphyrin-based metal-organic frameworks for the electrochemical oxygen reduction reaction

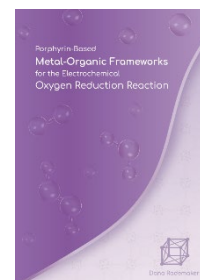
Author: D. (Dana) Rademaker

Supervisor: D.G.H. Hetterscheid, E. Bouwman

Co-supervisor:

Group: Surface Chemistry and Catalysis

Link: [Read or download this thesis](#)



1/21/2025

Perovskite-based photoelectrochemical investigations for artificial photosynthesis

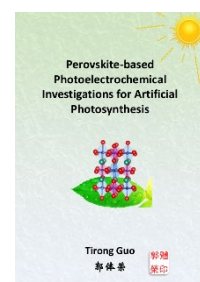
Author: T. (Tirong) Guo

Supervisor: H.J.M. de Groot

Co-supervisor:

Group: Biophysical Organic Chemistry

Link: [Read or download this thesis](#)



2/5/2025

Temperature and pressure effects on the electrochemical CO₂ reduction

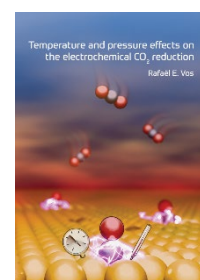
Author: R.E. (Rafaël) Vos

Supervisor: M. Koper

Co-supervisor:

Group: Surface Chemistry and Catalysis

Link: [Read or download this thesis](#)



2/6/2025

Unveiling the electrolyte effects of CO₂ electroreduction to CO and H₂ evolution from the interfacial pH perspective

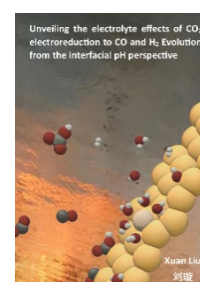
Author: X. (Xuan) Liu

Supervisor: M. Koper

Co-supervisor:

Group: Surface Chemistry and Catalysis

Link: [Read or download this thesis](#)



3/6/2025

Design and synthesis of inhibitors and probes for sulfoquinovosidases and xylanases

Author: Z. (Zirui) Li

Supervisor: J.D.C. Codée

Co-supervisor:

Group: Bio-organic Synthesis

Link: [Read or download this thesis](#)



3/6/2025

Synthesis of D-alanylated wall teichoic acids from staphylococcus aureus

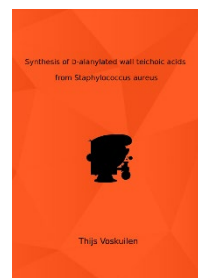
Author: T. (Thijs) Voskuilen

Supervisor: J.D.C. Codée

Co-supervisor:

Group: Bio-organic Synthesis

Link: [Read or download this thesis](#)



3/20/2025

Towards near-infrared light-activated combination chemotherapy

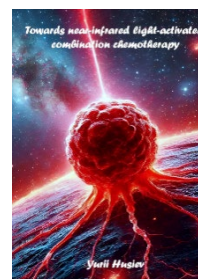
Author: Y. (Yurii) Husiev

Supervisor: S. Bonnet, E. Bouwman

Co-supervisor:

Group: Metals in Catalysis, Biomimetics & Inorganic Materials

Link: [Read or download this thesis](#)



4/3/2025

Deciphering the atomic structure of the electrified metal oxide-electrolyte interface

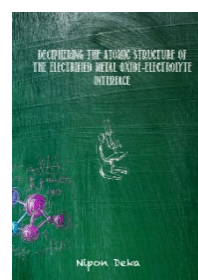
Author: N. (Nipon) Deka

Supervisor: M. Koper

Co-supervisor: R. Mom

Group: Surface Chemistry and Catalysis

Link: [Read or download this thesis](#)

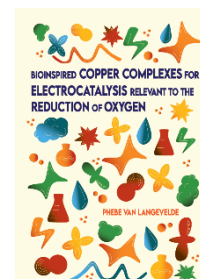


4/16/2025

Copper complexes for bioinspired electrocatalysis relevant to the reduction of oxygen

Author: P.H. (Phebe) van Langevelde
Supervisor: D.G.H. Hetterscheid, M.T.M. Koper
Co-supervisor:
Group: Surface Chemistry and Catalysis

Link: [Read or download this thesis](#)



5/13/2025

Design of branched swainsonines as selective Colgi alpha-mannosidase II inhibitors

Author: T.S. (Tony) Koemans
Supervisor: J.D.C. Codée
Co-supervisor:
Group: Bio-organic Synthesis

Link: [Read or download this thesis](#)

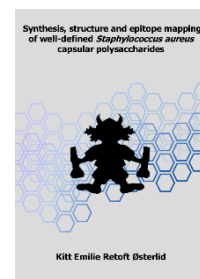


5/22/2025

Synthesis, structure and epitope mapping of well-defined Staphylococcus aureus capsular polysaccharides

Author: K.E. (Kitt) Østerlid
Supervisor: J.D.C. Codée
Co-supervisor:
Group: Bio-organic Synthesis

Link: [Read or download this thesis](#)

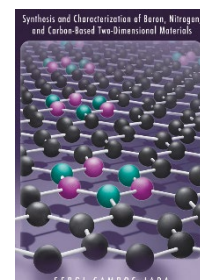


6/26/2025

Synthesis and characterization of boron, nitrogen, and carbon-based two-dimensional materials

Author: S. (Sergi) Campos Jara
Supervisor: I. Groot, M.T.M. Koper
Co-supervisor:
Group: Surface Chemistry and Catalysis

Link: [Read or download this thesis](#)



6/26/2025

Kinetic and non-kinetic effects for the alkaline oxygen evolution reaction on NiFeOOH electrocatalysts

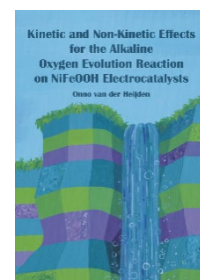
Author: O. (Onno) van der Heijden

Supervisor: M.T.M. Koper

Co-supervisor: R. Mom

Group: Surface Chemistry and Catalysis

Link: [Read or download this thesis](#)



9/2/2025

Design and synthesis of immunomodulatory peptide conjugates

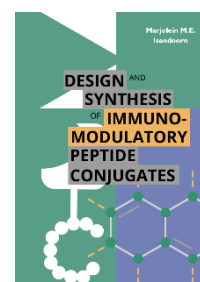
Author: M.M.E. (Marjolein) Isendoorn

Supervisor: J.D.C. Codée

Co-supervisor:

Group: Bio-organic Synthesis

Link: [Read or download this thesis](#)



9/4/2025

Coupled electronic and nuclear dynamics at interfaces of artificial photosynthesis devices

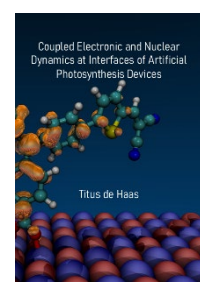
Author: T. (Titus) de Haas

Supervisor: H.J.M. de Groot, F. Buda

Co-supervisor:

Group: Biophysical Organic Chemistry

Link: [Read or download this thesis](#)



9/25/2025

Operando Spectro-electrochemical investigations of Pt and Pt-alloys as fuel cell catalysts

Author: H.J. (Hassan) Nagra

Supervisor: M.T.M. Koper

Co-supervisor: R. Mom

Group: Surface Chemistry and Catalysis

Link: [Read or download this thesis](#)



10/9/2025

Unravelling glycosylation reaction mechanisms

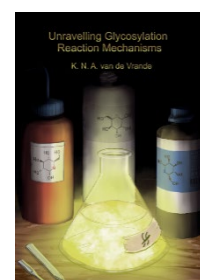
Author: K.N.A. (Koen) van de Vrande

Supervisor: J.D.C. Codée

Co-supervisor:

Group: Bio-organic Synthesis

Link: [Read or download this thesis](#)



10/21/2025

Getting the electrons right for O₂-on-metal systems

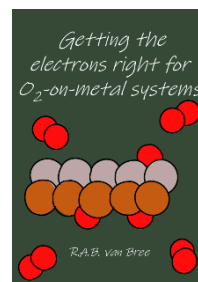
Author: R.A.B. (Robert) van Bree

Supervisor: G.J. Kroes, J. Meyer

Co-supervisor:

Group: Theoretical Chemistry

Link: [Read or download this thesis](#)



10/21/2025

Exploring reactive interfaces: nanoplastics, catalysts, and 2D materials

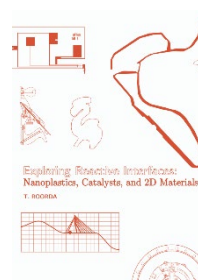
Author: T. (Tycho) Roorda

Supervisor: I. Groot, M.T.M. Koper

Co-supervisor:

Group: Chemistry and Catalysis

Link: [Read or download this thesis](#)



11/26/2025

Advances in 2D materials synthesis, transfer, and device integration

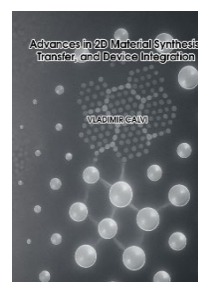
Author: V. (Vladimir) Calvi

Supervisor: I. Groot

Co-supervisor:

Group: Chemistry and Catalysis

Link: [Read or download this thesis](#)



12/5/2025

Electrocatalysis in confinement: metal-organic frameworks for oxygen reduction

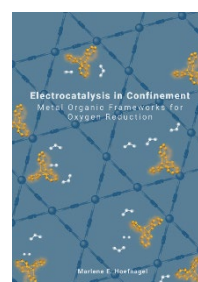
Author: M.E. (Marlene) Hoefnagel

Supervisor: D.G.H. Hetterscheid, E. Bouwman

Co-supervisor:

Group: Surface Chemistry and Catalysis

Link: [Read or download this thesis](#)



1/29/2025

Expanding polyisocyanide technology. Polymers for cancer and stem cell applications

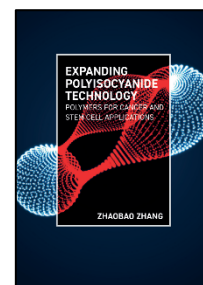
Author: Z. (Zhaobao) Zhang

Supervisor: F.P.J.T. Rutjes

Co-supervisor:

Group: Synthetic Organic Chemistry

Link: [Read or download this thesis](#)



2/21/2025

Carbohydrate allergies: the search for a needle in a haystack

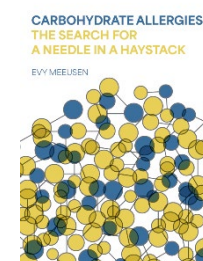
Author: E. (Evy) Meeusen

Supervisor: F.P.J.T. Rutjes

Co-supervisor: T.J. Boltje

Group: Synthetic Organic Chemistry

Link: [Read or download this thesis](#)



2/28/2025

High-Pressure-Mediated Synthesis of Cyclobutanes for Fragment-Based Drug Discovery

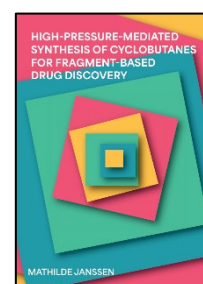
Author: M.A.C.H. (Mathilde) Janssen

Supervisor: F.P.J.T. Rutjes

Co-supervisor:

Group: Synthetic Organic Chemistry

Link: [Read or download this thesis](#)



3/10/2025

Integration of Advanced Mass Spectrometry in Electrochemical Research

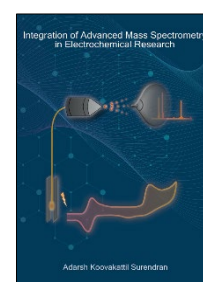
Author: A. (Adarsh) Koovakattil Surendran

Supervisor: J. Roithova

Co-supervisor:

Group: Spectroscopy and Catalysis

Link: [Read or download this thesis](#)



5/16/2025

**Unraveling Glycosylation Reaction Mechanisms:
The Quest for Immuno-Stimulating Oligosaccharides**

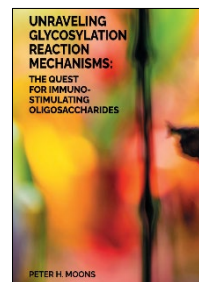
Author: P.H. (Peter) Moons

Supervisor: F.P.J.T. Rutjes

Co-supervisor: T.J. Boltje

Group: Synthetic Organic Chemistry

Link: [Read or download this thesis](#)



5/22/2025

**Hyphenated Electrochemistry-Electrospray Ionization Mass Spectrometry
for Molecular Perspective in Electrocatalytic Reactions**

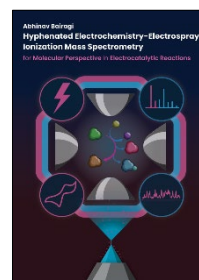
Author: A. (Abhinav) Bairagi

Supervisor: J. Roithova

Co-supervisor:

Group: Spectroscopy and Catalysis

Link: [Read or download this thesis](#)



5/23/2025

**Studying the mechanism of solid-state phase transitions
in molecular crystals**

Author: S. (Saba) Ghasemlou

Supervisor: H.M. Cuppen, B. Ensing

Co-supervisor:

Group: Theoretical Chemistry

Link: [Read or download this thesis](#)



6/3/2025

Spectroscopic investigations into small astrochemically relevant open-shell cations

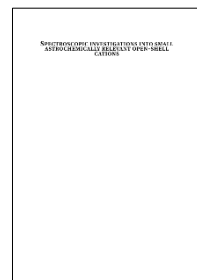
Author: K. (Kim) Steenbakkers

Supervisor: G.C. Groenenboom

Co-supervisor: S. Brünken

Group: Theoretical Chemistry

Link: [Read or download this thesis](#)



6/24/2025

From Molecules to Cells: Strategies to Target and Eliminate Autoreactive B-cells

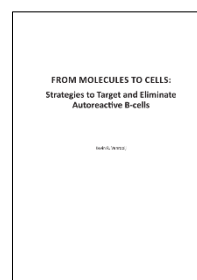
Author: K.R. (Kevin) Venrooij

Supervisor: F.P.J.T. Rutjes

Co-supervisor:

Group: Synthetic Organic Chemistry

Link: [Read or download this thesis](#)



1/10/2025

Navigating the Maze of Chemical Glycosylation: Detection and Characterization of Glycosylation Reaction Intermediates using Ion Spectroscopy and (Exchange) NMR techniques

Author: F. (Floor) ter Braak

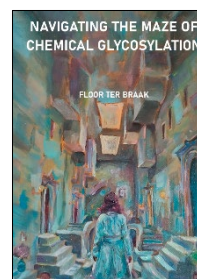
Supervisor: F.P.J.T. Rutjes, J.

Oomens

Co-supervisor: T.J. Boltje

Group: Synthetic Organic Chemistry

Link: [Read or download this thesis](#)



Fellowship Programme

21st call – April 2025



Prof. Dr. Manos Mavrikakis Professor, University of Wisconsin, USA

Hosted by Dr. Marc Koper (UL), Dr. Katharina Doblhoff-Dier (UL), Prof. dr. Peter Bolhuis (UvA).

Stay: 3 months



Prof. Mattanjah S. de Vries (John van Geuns fellow) Professor, University of California Santa Barbara, USA

Hosted by Prof. dr. Anouk Rijs (VU), Prof. dr. Wybren Jan Buma (UvA), Prof. dr. Jos Oomens (RU).

Stay: 7 weeks



Prof. dr. Titus S. van Erp Professor, Department of Chemistry, NTNU, Trondheim, Norway

Hosted by Prof. Dr. Peter Bolhuis (UvA), Dr. Jörg Meyer (UL).

Stay: 1 month

22nd call – October 2025



Dr. Anna Sinelshchikova (John van Geuns fellow), group leader, BCMaterials, Basque Center for Materials, Applications and Nanostructures, Spain

Hosted by Dr. Bettina Baumgartner (UvA).

Stay: 2 months

PhD Mobility Programme

11th call – April 2025



Bas Kreupeling from the group of Dr. F. Buda and Prof. dr. J.D.C. Codée (UL) has visited Dr. Damien Laage, Ecole Normale Supérieure, France.

Stay: 2,5 months



Jinwen Liu from the group of Prof. dr. M. Koper and Dr. K. Doblhoff-Dier (UL) has visited Dr. Frank Abild-Pedersen, SLAC National Accelerator Laboratory, USA.

Stay: 4 months



Maartje van Rijn (John van Geuns grant) from the group of Dr. S. Pullen and Prof. dr. J.N.H. Reek (UvA) has visited Prof. Dr. Victor Mougél, Department of Chemistry, ETH Zürich, Switzerland.

Stay: 2 months

12th call – October 2025



Ariba Adnan from the group of Prof. dr. M. Koper and Dr. R.V. Mom (UL) has visited Dr. Andrea Auer, Prof. Dr. Julia Kunze-Liebhäuser, University of Innsbruck, Austria.

Stay: 4 months



Anissa Haim from the group of Dr. I. Drienovská (VU) has visited Prof. dr. Jérôme Waser, Institute of Chemical Sciences and Engineering, School of Basic Sciences, Ecole Polytechnique Federale de Lausanne, Switzerland.

Stay: 3 months



Ying-Ying Lu from the group of Prof. dr. M. Koper and Dr. J.J. Geuchies (UL) has visited Prof. dr. Mischa Bonn, Dr. Lei Gao, Max Planck Institute for Polymer Research, Mainz, Germany.

Stay: 2 months

Financial Account 2025

Income		Expenses	
Contribution UvA 2025 - faculty ¹⁾	150.000	Donation HIMS Institute ¹⁾	150.000
Contribution UvA 2025 - HIMS ¹⁾	150.000	Personnel Costs	98.570
Fellowship JvGeuns - HRSMC (round 2025)	10.000	Office and management costs incl. Annual report	2.227
Correction Fellowship and PhD Mobility 2023	892	Fellowship and PhD Mobility Programme	40.500
Income Synthesis School	55.872	Synthesis School	51.212
Income High Impact Writing Course	9200	High Impact Writing Course	14.137
		Dick Stufkens PhD prize	2.313
		HRSMC Symposium 2025	11.080
		HRSMC Class of Excellence	3.977
		Courses	2.159
	€ 375.963		€ 376.174
Income minus Expenses	€ -211		

- 1) As of 2014, a new agreement between the VSNU (Association of universities in the Netherlands) and SODOLA has become applicable for the funding of Research Schools. Based on this agreement, as of 2015, the HRSMC should get funding of 300 KEuro. Instead of 50 kEuro from the faculty and 5 kEuro from the HIMS Institute, the contribution of the faculty is raised to 150 kEuro and 150 kEuro for the HIMS Institute. As this increase for the HIMS Institute would strongly affect HRSMC affiliated research groups from the UvA/HIMS Institute, the HRSMC Board decided to donate 150 kEuro to the HIMS Institute.
- 2) The HRSMC is grateful to **the John van Geuns foundation** for its financial support for the Fellowship and PhD Mobility Programme and the HRSMC Synthesis School.

