

Faculty of Science and Engineering

Profile report: Tenure track position in Electrochemical Synthesis and Catalysis (Electrochemische Synthese en katalyse)

- Discipline: *Electrochemistry, Organic Synthesis, Sustainable Chemistry, Redox catalysis*
- Level: tenure-track Assistant professor
- Fte: Full time (1,0)

1. Scientific discipline

Synthetic chemistry is a core discipline of the chemical sciences and a major challenge for the coming decades is the development of sustainable chemical synthetic processes. Electrochemical synthesis, electrocatalysis and photoredox-catalysis have the potential to replace current synthetic methods and allows industrial production based on low-cost electricity and low-waste transformations. Both in research and teaching, investment in high level electrochemical synthesis is warranted to maintain a frontier international position in synthesis and chemical conversion.

2. Vacancy

This position is opened by the Board of the Faculty (ref. JK/gl/17/01066) and will be embedded in the Stratingh Institute for Chemistry, basic unit Synthetic Organic Chemistry. The position falls within the framework of 'Career Paths in Science 4' ('Bèta's in Banen 4'). Please see link for [criteria and conditions](#).

3. Selection committee (BAC)

Prof. Dr. A.J. Minnaard, director of the Stratingh institute, CBBC-fellow, Chair
Prof. Dr. B.L. Feringa, Stratingh Institute/chair executive board ARC-CBBC
Prof. Dr. S.R. Harutyunyan, Stratingh Institute, CBBC-fellow
Prof. Dr. C. Esteves, Eindhoven University of Technology
Prof. Dr. W.R. Browne, Stratingh institute, CBBC-fellow
Prof. Dr. S. Otto, Stratingh Institute, CBBC-Fellow, director of the Master Chemistry
C. van Beek, Student member, Master Chemistry
Added: L. Boomsma, HR, and Prof. Dr. M. Tromp (Zernike Institute of Advanced Materials) as an advisor.

4. Research area

The research area is synthetic organic chemistry, in particular electrochemical synthesis, whereas efforts in photoredox catalysis could be supportive. In the chemical sciences there currently is a major world-wide development toward novel sustainable (low waste, low energy, low step economy) chemical transformations to provide a basis for our future chemical industry. Electrochemical synthesis is expected to be a major contributor to this development. To establish a strong innovative research program and high level education in this rapidly emerging area, a new group in electrochemical synthesis and catalysis will be formed. The position will be complementary to the present synthesis and catalysis groups and will

strengthen the position of the Stratingh Institute and the Faculty of Science and Engineering at our university in this field. Via ARC-CBBC it will also strengthen academic–industrial cooperation aiming at electrification of chemical processes with the multinationals Shell, AKZO-Nobel and BASF. The position is also unique in The Netherlands; other electrochemical activities focus on physical electrochemistry (i.e. Prof. M. Koper, Leiden University, Prof. W.R. Browne, University of Groningen), batteries (Prof M. Tromp, University of Groningen) or materials (photovoltaics, etc.). Combining the strength in synthesis, catalysis and spectroscopy in the Stratingh Institute with the new activities in synthetic electrochemistry will position Groningen as a highly visible international expertise center in sustainable chemistry.

5. Embedding

The Stratingh Institute for Chemistry focuses on research in molecular and supramolecular chemistry, with overarching impact on biology, chemical engineering, and physics based on fundamental organic and inorganic chemistry. It covers three research areas:

- Chemistry of Life: This area concentrates on a molecular approach to the study of biological phenomena and medically relevant problems, including the synthesis of complex natural products, the design and synthesis of small molecules to study and steer biochemical and cellular processes, and emerging properties like self-organisation and catalysis, including life itself.
- Chemical Conversion: This area investigates new synthesis and catalysis methods, including asymmetric catalysis and oxidation catalysis, designing artificial enzymes for new-to-nature reactions, the use of bio-based feedstocks and development of sustainable processes, and homogeneous catalysis methods using earth-abundant metals.
- Chemistry of Materials: This area covers various topics in nanoscience with a focus on advanced functional materials, such as molecular switches and motors, photovoltaics, functional polymers, molecular electronics, supramolecular materials, functional surfaces and artificial membrane components.

6. Local and (inter)national position

The position will be one of the main pillars of the University of Groningen hub of the national Advanced Research Center Chemical Building Blocks Consortium ARC-CBBC (arc-cbbc.nl). The group will cooperate closely with the other groups within CBBC and the Stratingh Institute for Chemistry, and potentially with groups from the Engineering and Technology Institute Groningen (ENTEG) to establish a strong center for sustainable synthetic chemistry and chemical conversion at the University of Groningen. This is accompanied by recent major investments in facilities and equipment.

The Stratingh Institute for Chemistry has built over the years an extensive collaboration network nationally and worldwide. More specifically within the research area “chemical conversion”, there are collaborations with the neighboring research institute ENTEG. Research groups within the Stratingh Institute take part in national research consortia, e.g., the Gravitation Program Functional Molecular Systems, the National Institute for

Catalysis (NIOK), ARC-CBBC, the Origins Center, and in local research networks such as the CoFund program ALERT and the FOM-FOCUS group Organo Photovoltaics. The Stratingh institute has a long tradition of cooperative projects with industry (DSM, Unilever, AKZO/NOBEL, Shell, Solvay) and participates in many international projects (e.g. Harvard Univ., Univ. of Leuven, ECUST Shanghai, Nagoya Univ., EMPA Zurich, Univ. Bologna, Univ. Colorado, UCLA, Univ. Tokyo).

The Stratingh Institute for Chemistry has an (inter-)national excellent position in synthetic chemistry and catalysis and in the Dutch chemical landscape is recognized as a stronghold for synthesis. Members of the Stratingh institute were among the founding fathers of the national ARC-CBBC and recognized among the three hubs (Utrecht, heterogeneous catalysis; Eindhoven, chemical engineering; Groningen, synthesis, homogeneous catalysis, materials).

7. Expected contributions to research

The candidate is expected to build her/his own research group in the field of synthetic electrochemistry and catalysis and establish a strong and international recognized expertise center in this field. Cooperative research programs will be established within the Stratingh institute, with ARC-CBBC partners and with industry. The electrochemical synthesis expert center, run by the group, will also facilitate high level training both for academia and industrial partners. In addition, through combining current expertise in synthesis, catalysis and physical organic chemistry with electrochemistry in new research lines, the candidate will create a strong position in redox chemistry in the institute. Obtaining substantial extramural funding is key to attaining these objectives.

8. Expected contributions to teaching

The candidate will teach in particular in the BSc Chemistry & Chemical Engineering and in the Master Chemistry. The candidate will contribute to teaching in the field of organic chemistry and, at the masters level, to advanced courses in the field of redox chemistry. Supervision of bachelor and master students in their research projects is also part of the teaching contribution.

9. Expected contributions to the organization

The candidate is expected to have an active interest and to provide a positive contribution to the management and organizational tasks of the institute. At the level of the FSE, the candidate will contribute to the organization of the faculty, for example by participating in working groups and committees, in the fields of teaching, research and management. The candidate will participate in relevant national and international organizations.