

## **Faculty of Science and Engineering**

### **Profile report: Polymer Science (Polymeerwetenschappen)**

- Discipline: Chemistry
- Level: Tenure Track Assistant/ Associate professor
- Fte: Full time (1,0)

#### **1. Scientific discipline**

Polymer science is a fast moving field that has a major impact on the way we live. Making use of the flexibility of polymer chemistry and the ease of polymer processing, polymer science allows to develop complex materials to suit the needs of society and the planet. This vital branch of science encompasses chemistry, physics, mathematics, biochemistry, thermodynamics, energetics and multi-faceted engineering applications as integration with the core subject. Polymer Scientists study how smaller building blocks (monomers) combine, and create useful materials with specific characteristics by manipulating the molecular structure of the monomers/polymers used, the composition of the monomer/polymer combinations, and applying chemical and processing techniques that can, to a large extent, affect the properties of the final product.

#### **2. Vacancy**

This position is opened by the Board of the Faculty (PT/gl/17/00858) and will be embedded in the Zernike Institute for Advanced Materials. The position falls within the framework of 'Career Paths in Science 3' ('Bèta's in Banen 3'). Please see link for [criteria and conditions](#).

#### **3. Selection committee (BAC)**

Prof.dr.ir. C.H. van der Wal, Scientific Director Zernike Institute and professor  
Physics of Quantum Devices  
Prof.dr. K.U. Loos, professor Macromolecular Chemistry and New Polymeric  
Materials  
Prof.dr. P. Rudolf, professor Experimental Solid State Physics and director Graduate  
School of Science  
Prof. dr. F. Picchioni, professor Chemical Product Technology  
Prof. dr. Volker Abetz, scientific director Institut für Polymerforschung at  
Helmholtz-Zentrum Geesthacht, Germany  
Prof.dr.ir. Erik van der Giessen  
Roos van Lier (student member)  
Dr. G. Portale, Advisor  
Mrs. A. van der Woude, HR-Advisor  
Dr. J.P. Birkner, Research Manager, Advisor

If appropriate, this BAC will schedule interactions and seek written recommendations from institutes of the UG not represented in this committee, such

as Stratingh Institute for Chemistry, GBB (Biomolecular Sciences and Biotechnology), GRIP (Institute for Pharmacy) or UMCG-Kolff (Biomedical Materials at University Medical Center).

#### **4. Research area**

Polymer Science has enormous impact on contemporary materials science. Its goal is to provide the basis for the creation and characterization of polymeric materials and an understanding of the structure/property relationships. Polymer science is of increasing importance for everyone's daily life. It has permeated the modern world with polymeric products finding application areas ranging from construction materials (like e.g. concrete) to drug delivery and drug formulation, from computing hardware to optoelectronics.

Macromolecules, including biomacromolecules, synthetic block copolymers and polymer hybrid materials, can self-assemble into a rich variety of structures with internal length scales ranging from few nanometers up to millimeters. This behavior makes polymers ideal candidates for emerging (nano)technologies.

The Zernike Institute is looking for an outstanding candidate to develop a world-leading research program in polymer science. The candidate shall be able to strengthen the research efforts of the University of Groningen in at least one of its polymer related research fields comprising chemical, physical, engineering, processing, and theoretical aspects and to start new research initiatives based on advanced high-molecular-weight polymer systems. Fields of interest could include (but are not limited to) biologically inspired strategies to develop new concepts in material science, responsive/switchable polymer concepts for advanced membrane or hydrogel systems.

#### **5. Embedding: institute (and base unit)**

The research groups of the Zernike Institute active in polymer research form a local cluster and share facilities. This cluster of research groups is in the following denoted as department of polymer chemistry.

The Polymer Science group will be embedded in the department of Polymer Chemistry of the Zernike Institute for Advanced Materials. The Zernike Institute for Advanced Materials of the Faculty of Science and Engineering is a leading institute in the field of Materials Science. It has embraced interdisciplinary research since 1970. Its goal is to encourage excellent collaborative materials research with expertise from physics, chemistry and bioengineering/biophysics, while respecting and stimulating the expertise and high quality of the individual groups. This setup allows fostering young, talented researchers in a multidisciplinary research environment, leading to groundbreaking discoveries. About 30 principal investigators are currently organized in 17 research units of which four focus on theoretical and 13 on experimental research. In total the Zernike Institute hosts 260 staff members.

The Department of Polymer Chemistry is one of the leading players in the field of Polymer Science with current research activities ranging from fundamental studies to membrane and device fabrication. The department's current research aligns with the Universities societal themes Sustainable Society and Energy: It hosts one of the

international leading groups in the field of biocatalytic pathways to polymeric materials;

Besides that, its researchers focus on - among other things - ion-conducting polymers for electrochemical applications and conducting polymers for thermoelectric applications. In addition the department is known for innovation and research in polymer processing – it hosts extensive capabilities and facilities across a wide range of processes, including plastics design, manufacturing and disposal with a strong focus on low environmental impact processing.

Currently the department of Polymer Chemistry consists of two staff members, Prof. dr. K.U. Loos (focusing on Macromolecular Chemistry and New Polymer Materials) and Dr. G. Portale (focusing on Polymer Physics/Physical Chemistry of Polymers) and honorary Prof. Ton Loontjens (focusing on Biomedical Polymers).

## **6. Local and (inter)national position**

The University of Groningen has a long tradition of excellent research in the field of polymer science, being the first university in the Netherlands to host a department solely related to polymer research and education. Over the past 50 years the cooperation between polymer synthesis, polymer physics and theory guaranteed the international reputation of the University of Groningen.

Polymer Science research efforts are not only embedded in the Zernike Institute for Advanced Materials. Research groups of the ENgineering and TEchnology institute Groningen (ENTEG) are specialists in polymer processing, catalysis etc., groups of the Stratingh Institute for Chemistry are world renown in the field of polymer electronics and plastic solar cells and researcher of the Groningen Biomolecular Sciences and Biotechnology Institute (GBB) study among other things functional properties of polysaccharides and other biopolymers. The Polymer Chemistry Department has synergistic relations with the groups mentioned above and besides that collaborates with theoretical groups of the Berendsen Center for Multiscale Modeling and Materials Design.

The University of Groningen stimulates and supports collaboration between the public and private research sector and by this strongly contributes to economic development and competitiveness; while maintaining its traditional grand roles of research and education. Polymer scientists of the University of Groningen have a strong tradition of cooperating with industry, one recent example being the newly established multi-partner chemical industrial partnership program NanoFun that the university leads.

The University of Groningen is part of Campus Groningen, that facilitates the vivid exchange of all knowledge institutes, entrepreneurs, investors and the local government to work together on innovative solutions in all fields of science – having a strong focus on polymer science. It is also part of the Bio Economy Region Northern Netherlands (BERNN), which is an alliance of the four Northern universities of applied sciences and the University of Groningen.

Within the Netherlands research in the field of Polymer Science is pursued at the 4 Technical Universities (Twente, Eindhoven, Delft, Wageningen), University of Amsterdam, Nijmegen University, University of Maastricht, Leiden University and

Utrecht University. The groups of the University of Groningen cooperate with the groups of these universities in various (inter)national consortia.

The global players in the field are among others the Helmholtz Center Hamburg (Germany), MPI for Colloids and Polymers (Germany), University of Minnesota (USA), University of Massachusetts Amherst (USA), Nagoya University (Japan), and University of Sidney (Australia).

## **7. Expected contributions to research**

The candidate is expected to initiate and develop a research program in the field of Polymer Science.

The research should have a visibility both at the national and the international level and lead to publications in top journals. The research is expected to cross-fertilize the existing research within the institute and should lead to a strengthening of the international reputation of the group and the institute.

Obtaining substantial external funding is crucial. Supervision of PhD students is an important part of the research activities. The research is expected to strengthen the existing efforts within the Zernike Institute in the field of Polymer Science and to take an international leadership role.

## **8. Expected contributions to teaching**

The candidate is expected to teach at the bachelor and master level within the Undergraduate and Graduate Schools of Science and Engineering, and to contribute to the Topmaster program in Nanoscience organized by the Zernike Institute. She/he is expected to participate in the teaching program of specialized courses in relation to Polymer Science and other related topics.

Furthermore, the candidate will be involved in supervising bachelor, master and PhD students.

## **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.