1. Scientific discipline
Molecular biophysics addresses the properties, dynamics and interactions of biomolecules and aims at mechanistic insight into biological systems, from molecule to cell. Processes are studied on different time and length scales, down to single molecule resolution, both \textit{in vitro} and \textit{in vivo}. This opens opportunities for engineering biofunctionality and (bio)materials and leads to a deep understanding of essential processes of life.

2. Vacancy
This position is opened by the board of the Faculty of Mathematics and Natural Sciences (FMNS 14/00125) and will be embedded within the Zernike Institute for Advanced Materials.

3. Selection Committee (BAC)
Prof. T.T.M. Palstra, scientific director of the Zernike Institute for Advanced Materials and professor Solid State Chemistry,  
Prof. P. Rudolf, director Graduate School of Science and professor Experimental Solid State Physics  
Prof. P.R. Onck, professor Micromechanics  
Prof. B. Poolman, scientific director of the Groningen Biomolecular Sciences and Biotechnology Institute and professor Biochemistry – Membrane Enzymology  
Prof. A. Herrmann, professor Polymer Chemistry and Bioengineering  
Prof. M. Dogterom, external member, professor Bio-assembly & - organization, Head of Department Bionanoscience TU Delft  
Student member

Dr. J.P. Birkner (advisor, scientific coordinator Zernike Institute)  
A.M. van der Woude (HR-advisor)

4. Short description
The general profile of the position is experimental molecular biophysics, exploiting novel microscopic and spectroscopic techniques to better understand complex biomolecules, hybrid biomolecular materials and essential processes of life. The candidate is expected to develop a research programme that aims at the application of (optical) microscopy and spectroscopy to current problems in (bio)molecular physics, (bio)molecular chemistry and materials science, as well as at further development of experimental techniques for the life sciences. A strong interaction with theoretical/computational groups and other experimental groups within the Zernike Institute.
5. Discipline and external situation
Experimental molecular biophysics is a broad discipline that is concerned with the application and development of methods from physics and physical chemistry for manipulating and studying the properties of biomolecules, biomolecular materials and cellular systems. Within this discipline, optical microscopy and spectroscopy and force measurements have always taken an important place. During the past decade, there has been a revolution in optical techniques, allowing molecules to be positioned and processes to be tracked in living cells below the resolution limit of light. These methods are now increasingly used to image and probe (the dynamics of) individual building blocks of (bio)materials and biological systems and their relation to each other. These developments have opened entirely new views on the behaviour of biological systems and open unprecedented possibilities to analyse and engineer novel (bio)materials. Examples are studies of DNA replication and transcription and protein traffic in living cells, the dynamics of individual polymers in their complex matrix, and the characterization of the mechanical properties and assembly dynamics of biopolymers. Important relevant developments are found in single-molecule spectroscopy, super-resolution optical microscopy, and the combination of optical methods with force or electrical measurements. Nowadays, these techniques form an integral part of the biochemical and physical nanosciences, and have indeed opened possibilities to study the structure, dynamics, and the time evolution of individual molecules either in vitro or in vivo.

At the national level there are several very active research groups in the field biophysics, specifically in Amsterdam (AMOLF Institute, VU, UvA), Leiden, Twente and Delft. The Netherlands has a high concentration of top biophysicist and is internationally leading in this field. Groningen is in the unique position to link the biophysics of the cell to that of molecular materials and contribute to biomolecular and bioinspired functionality. Moreover, the biophysical research can cross borders to medicine and explore pathological processes, through close interactions with groups at ERIBA and the University Medical Center Groningen.

The main national sources for funding the research on Molecular Biophysics are administrated by the Netherlands Organization for Scientific Research (NWO) through their Physical (FOM), Chemical (CW), Life Sciences (ALW) and Technical Sciences (STW) divisions. There are excellent international funding programs, such as ERC and FET, available for the emerging field of molecular biophysics.

6. Research group and institute
The Zernike Institute for Advanced Materials of the Faculty of Mathematics and Natural Sciences has a research programme comprising theory, design, synthesis and analysis of biological systems and materials under one roof and is leading in these fields. The Molecular Biophysics group is embedded in the Zernike Institute for Advanced Materials. Currently, the research group is equipped with state of the art equipment for single-molecule studies of biomolecular, cellular and materials
systems, including super-resolution optical, wide-field total-internal reflection, and confocal microscopy. The group has synergetic relations not only with groups within the Zernike Institute, but also with research groups from life-sciences (Groningen Biomolecular Sciences and Biotechnology Institute, GBB), the University Medical Center (UMCG) and the European Research Institute for the Biology of Ageing (ERIBA).

Apart from the candidate, the group consists of two staff members, assistant professor T. Cordes (focusing on the dynamics of membrane proteins and the design and characterization of fluorescence-based read-out systems) and Dr. V.V. Krasnikov (laser physicist who is instrumental in the development and maintenance of the hardware). Next to research and general teaching activities the group is currently responsible for coordinating the Bachelor track ‘Physics of Life’.

7. Expected contributions to research

The candidate is expected to initiate and develop an internationally leading research programme in the field of Molecular Biophysics.

The research should have a visibility on the national and worldwide level and lead to publications in top journals. Further it is expected, that the new professor will take a leading role in the molecular biophysics field within the Netherlands. The research is also 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 for PhD projects 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 molecular biophysics and to take an international leadership.

8. Expected contributions to teaching

The candidate is expected to contribute to the teaching programmes in the bachelor and master degree programs within the Undergraduate and Graduate Schools of Science as well as to the Topmaster programme Nanoscience, organized by the Zernike Institute.

She/he is expected to participate in the teaching programme of specialized courses in relation to molecular biophysics and other related topics, e.g. the bachelor track ‘Physics of Life’.

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

Upon appointment, depending on experience and formal qualifications to date, the candidate may be required to enter a nationally standardized tertiary teaching skills certification trajectory (BKO or Basis Kwalificatie Onderwijs), successful completion of which is a condition for extensions and tenure.

9. Expected contributions to the organisation

The candidate is expected to play a role in the general organisation of research within the faculty and the institute. Furthermore, contributions to existing and new teaching programmes are expected, as well as to the management of education.
10. Career perspective
The position will be offered as a full or associate professorship according to the document “Career Paths in the Sciences” of the faculty (www.rug.nl/fwn/careerpathsinscience).