PhD student in biophysics on single-protein sensing using the NEOtrap & NEO-FRET.

We are looking for a highly skilled and motivated PhD student in interdisciplinary biophysics to advance our newly developed single-molecule technique for protein detection: the NEOtrap = Nanopore Electro-Osmotic trap.

Research project: The NEOtrap [1,2,3] is formed by a DNA-origami structure docked onto a nanopore to (i) form a nanoscale cavity, and (ii) induce an electro-osmotic trapping potential. This allows us to sense the behaviour of a single protein over time, similar to smFRET or optical/magnetic tweezers. The big advantage is however that the NEOtrap works label-free using native proteins, plus it is not limited by photo-bleaching, and does not rely on mechanical unfolding. The NEOtrap is further unique, in that it covers up to 8 orders in time (microseconds to hours), which is ideal to detect the broad range dynamics observed in proteins. The NEOtrap has already proven to distinguish not only proteins of different molecular weight, but even nucleotide-dependent conformations of the same protein, which demonstrates excellent sensitivity thus opening the way for many exciting next steps including electrical detection of protein dynamics, enzymatic reactions, protein fingerprinting, electro-optical combinations etc.

Candidate profile: For this innovative, interdisciplinary, and NWO-funded 3-4year project, we are immediately looking for an enthusiastic PhD student, trained in physics, interdisciplinary nanoscience, biochemistry or similar areas. Practical experience in these areas, and in single-molecule experiments and analysis are desired. The following skills will be necessary (and can be acquired) during this project: single-molecule kinetics, nanofluidics/nanoscale detection, optics and FRET, protein biophysics and protein biochemistry techniques, advanced data analysis and pattern recognition. We further expect the candidate to have an independent, well-organized and reliable work style, to be communicative and interested in the broader field of single-molecule biophysics, thereby contributing to our open and interactive lab culture. It goes without saying that we look for friendly and driven humans of all kind to enrich our team. We would like to welcome the new team member by January 1st 2023 (with some flexibility).

Group profile: At the NanoDynamicsLab, we are an ambitious interdisciplinary group of people with backgrounds ranging from physics to biochemistry, which creates a stimulating atmosphere where everybody learns from each other. What bonds us together is the fascination for ‘things that move at the nanoscale’, and the drive to understand and control how life emerges from biomolecular dynamics. To this end, we collaborate with several groups in-house at WUR, within the thriving biophysics community in The Netherlands, and beyond. As we work in a highly communicative way, you are invited to send your further questions straight to Sonja or other members of the group.

Please send your application by Oct 31st 2022 or earlier to schmid [at] nanodynlab [dot] org. Please use the subject ‘PhD Student Application: YOUR NAME’, and include a motivation letter, CV, and email addresses of 2-3 references. Thank you.