Postdoctoral position(s) in RNA biophysics and structural biology under biologically relevant conditions

Petzold Lab · Department of Medical Biochemistry and Microbiology (IMBIM) · Uppsala University

How does an RNA change shape in order to do its job and does it do the same thing inside a living cell? If that question interests you, read on.
We are looking for one or more postdocs to work on RNA regulation: microRNAs, ribosomes, and the structural changes that control them. You will use and develop state-of-the-art methods, such as NMR, chemical probing / SHAPE, and other biophysical approaches, increasingly inside cells rather than only in a tube. We are an international, supportive and genuinely curious team, and we are looking for colleagues who enjoy solving hard problems together.

The science
Less than 2% of the human genome encodes protein, yet a large fraction of it is transcribed into RNA. Non-coding RNAs are ubiquitous across all forms of life, and how they regulate cellular function is still largely unknown. In the Petzold Lab, we want to understand how RNAs change their structures in order to perform their function. We work on structural dynamics of viral, bacterial and eukaryotic regulatory RNAs, and we develop Nuclear Magnetic Resonance (NMR), chemical probing, and RNA biochemistry needed to reach them. And when the mechanism of one of these molecular machines becomes visible, it often also reveals new drug targets. Some recent examples of what that looks like in practice:

- a base-pair conformational switch that modulates miR-34a targeting of Sirt1 mRNA (*Nature*, 2020);
- the organisation of miR-34a within human Argonaute-2, resolved by NMR (*NAR*, 2024);
- an antisense drug complex observed in intact human cells by in-cell NMR (*ChemBioChem*, 2019).

The full list is here: petzoldlab.com/publications. Training in this area positions you well for RNA-based medicine in industry and for RNA-based research in academia, with both growing quickly currently.

Project areas
We will shape your project together, based on your background and what you are curious about. Current directions are:

1. **How do microRNAs choose their targets?** What distinguishes one mRNA target from another; what makes an mRNA accessible (structure, protein occupancy, ribosome read-through, stability); and what the microRNA:mRNA complex looks like, including how dynamic they are, e.g. in the context of human Argonaute-2.
2. **From mechanism to medicine.** We are developing a microRNA-based anti-cancer drug. You would help design and develop a new class of drug.
3. **Structural biology inside the cell.** Biophysics has taught us a great deal about purified molecules. What changes when we look inside the cell? We develop in-cell solution and DNP-enhanced solid state NMR and in-cell biophysics / chemical probing.
4. **Faster, more sensitive RNA dynamics.** Method development to make RNA dynamics measurements quicker and more sensitive, and an NMR-informed probing approach that extends dynamics measurements to a much wider range of RNA systems.
5. **How does the ribosome move?** This large machine moves while it produces proteins, but how? That is what we are trying to find out.

How we work
We are a dynamic, international and multidisciplinary group, with close collaborations in Sweden and abroad. In practice, that means weekly group meetings where everyone presents and everyone asks questions, a lot of time at the whiteboard, and a culture in which a result that does not fit the model is

treated as interesting rather than as a failure. We like each other's company, we celebrate what works, and we help each other with what does not.
Your main task is high-level research, both independently and as part of the team. We expect you to take the lead in producing, analysing, and conceptualising your own results, to contribute to colleagues' projects, to co-write manuscripts, and to help keep a shared lab running well. You will also be involved in a smaller amount of teaching and supervision.

What we offer

- **Instrumentation.** Access to 600MHz liquid-state TXI probe with bioreactor and UU's NMR center in house, our own Nanopore sequencer, plus the strong spectroscopy, biophysics, structural biology, analytical and organic chemistry environments at the Biomedical Centre (BMC) and SciLifeLab. IMBIM spans biochemistry, cell and molecular biology, tumour biology, comparative genetics, functional genomics, immunology, bacteriology and virology.
- **Supervision and career development.** Regular one-to-one meetings, an individual development plan, and active support for your own fellowship applications. Funding for at least 1 international conference per year.
- **A transferable method portfolio.** NMR, chemical probing/SHAPE, RNA production and biochemistry, and data analysis with computational approaches, a combination that transfers directly to both industry and academia.
- **Uppsala.** A vibrant university town 40 minutes from Stockholm and 20 minutes from Arlanda airport with an incredibly high standard of living. What it is like to work and live here.

Who we are looking for

We are looking for someone motivated, organised and curious, who wants to explore new avenues in science rather than only execute a plan. You should be capable of working independently and in a team, as well as comfortable thinking out loud with other people. Most of our best results have come from someone in the group asking an awkward question at the right moment.

Formal requirements

- A PhD in biology, chemistry, physics or a related subject, or a foreign degree equivalent to a Swedish PhD. The degree must be obtained by the time of the appointment decision.
- Priority will be given to applicants who completed their degree no more than four years before the application deadline. This period can be extended for circumstances such as illness, parental leave, military service or trade union duties. Please provide documentation for extension reasons that might apply to your case.
- Fluency in English, written and spoken.

Additional qualifications

None of the following is required, but each is an advantage: a background in RNA biochemistry or biophysics; experience with NMR, SHAPE or other chemical probing methodology, cryo-EM, or computational approaches to nucleic acids and structural biology; programming and advanced data analysis. An interest in multidisciplinary work matters more to us than a specific technique, we can teach the technique.

How to apply

Please submit one PDF in English to katja.petzold@imbim.uu.se, containing the following in this order:

- A personal letter (max. 1 page): why RNA biochemistry, structural biology or biophysics, and which questions in this area you find worth answering.
- A CV (max. 3 pages), including the date and title of your thesis defence, previous and current academic positions, academic distinctions, committee work, and contact details for at least two references.
- A complete publication list.

- A summary of your current work (max. 1 page).
- A short project proposal (max. ½ page). Name the project area above that interests you most, and tell us what you would want to do with it. We are more interested in how you think about a problem than in a polished plan.
- A short note on generative AI (max. ½ page, separate from the personal letter). We use these tools ourselves and we are interested in your view: Where do you think they are useful in research, and where are they not? If you used an LLM in preparing this application, please state so and describe how. This is not held against you; not disclosing it is.
- Documentation for any circumstances you would like credited towards the eligibility period above (illness, parental leave, military service, work for a trade union or student organisation, or similar).

Terms and practical information

We offer two-year (one plus one year extension) postdoctoral positions funded by a scholarship (stipendium), full time, based in Uppsala. A scholarship is not an employment: Scholarship holders are not employees of Uppsala University and are not covered by the benefits that follow from employment (e.g. receiving retirement funds). Scholarships are not taxed. Please read Conditions for scholarship holders before applying, and contact us if anything is unclear. Monthly amount is around **~30.8000 SEK, tax-free**.

Starting date: by agreement.

Application deadline: **31st of October 2026**.

Questions about the position and the application are very welcome: Katja Petzold, katja.petzold@imbim.uu.se, and Saskia Rughöft, saskia.rughoft@kemi.uu.se.