



FWO Research Consortium

LECTURE INVITATION

03:00pm **Polypept(o)ides: From Novel Materials to Functional Systems for Diagnosis and Therapy**

Prof. Dr. rer. nat. habil. Matthias Barz, Full Professor for Biotherapeutic Delivery,
Leiden Academic Center for Drug Research (LACDR)

The seminar will take place on **Wednesday 15th of September** in **Lokaal 0.3 – Alexander Fleming** at the **Faculty of pharmaceutical sciences**,
Ottergemsesteenweg 460, 9000 Ghent, Belgium.

Contact

Prof. Katrien Remaut (Katrien.Remaut@UGent.be)

Biography

Dr. Matthias Barz studied chemistry at the Johannes Gutenberg-University (JGU) Mainz (Germany) and the Seoul National University (South Korea), received a diploma degree in chemistry in 2006 and a PhD in polymer chemistry in 2009 (Prof. R. Zentel). Afterwards, he worked in the laboratory of Maria J. Vicent at the CIPF (Valencia, Spain) and T. Kirchhausen at Boston Children's Hospital (Immune Disease Institute), Harvard Medical School. In 2013 he became independent junior research group leader at the JGU and established polypept(o)ides as functional biomaterial. Since 2013 he is member of the steering committee, head of the graduate center and speaker of junior PIs of the CRC 1066: Nanodimensional Polymer Therapeutics for Tumor Therapy (Mainz, Germany). He finished his habilitation and became lecturer for organic and polymer chemistry at the JGU in 2017. Since 2020 he is full professor for biotherapeutic delivery (Biopharmacy) in the Division of Biotherapeutics at the LACDR, Leiden University (Leiden, The Netherlands).

Matthias Barz has published more than 120 research papers, commentaries, reviews, book chapters and patents. For his independent research he received numerous awards, including the prestigious Dozentenpreis (FCI, most important junior faculty award in chemistry in Germany), the Hermann Schnell Scholarship (GDCh), Research Award GDCh (German Chemical Society, Division of Macromolecular Chemistry) for Young Faculty (Nachwuchswissenschaftlerstipendium) (2017), the Roche pRED Award for Excellence in Applied Cellular and Molecular Biology in Drug Delivery at the (Roche-Nature Biotechnology Symposium, Buonas, Switzerland 2014), and was named ACS PMSE Young Investigator in 2018.

Polypept(o)ides:

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The Barz Lab focuses on the development of polypept(o)ides – a hybrid material combining polypeptides and polypeptoids, e.g., polysarcosine (1). The stealth properties of polysarcosine enables the synthesis of long circulating nanoparticles without detectable protein corona (2). Our central aim is to meet the complex requirements of advanced diagnostic and therapeutic systems with robust, clean, and scalable chemistry to develop not only potent therapies, but enable their clinical translation. The reduction of synthetic efforts requires rethinking of existing concepts and developing new organic (3) or polymer chemistry (4).

In this lecture, a brief overview on our work with focus on the therapy of bacterial infections (5), tumor immune therapies (6,7), vaccine development, mRNA induced immune therapies (8), as well as tumor imaging and (radio)therapy employing in vivo click chemistry (9) is presented.

References:

- 1) Birke A, Ling J, Barz M*. Polysarcosine Containing Copolymers: Synthesis, Characterization, Self-Assembly, and Applications. *Prog. Polym. Sci.* **2018**, 81, 163-208.
- 2) Alberg I et al. Polymeric Nanoparticles with Neglectable Protein Corona. *Small* **2020**, 16(18), e1907574.
- 3) Schäfer O et al. Rethinking Cysteine Protective Groups: S-Alkylsulfonyl-L-Cysteines for Chemoselective Disulfide Formation. *Chemistry: A European Journal* **2016**, 22 (50), 18085-18091.
- 4) Klinker K et al. Secondary Structure-Driven Self-Assembly of Reactive Polypept(o)ides: Controlling Size, Shape and Function of Core Cross-Linked Nanostructures. *Angew. Chem. Int. Ed.* **2017**, 56 (32), 9608-961.
- 5) Fenaroli F et al. Enhanced Permeability and Retention-like Extravasation of Nanoparticles from Vasculature into Tuberculosis Granulomas in Zebrafish and Mouse Models. *ACS Nano* **2018**, 12 (8), 8646-8661.
- 6) Johann K et al. Therapeutic melanoma inhibition by local micelle-mediated cyclic nucleotide repression. *Nature Commun.* **2021**, in press.
- 7) Bauer TA et al. Core Cross-Linked Polymeric Micelles for Specific Iron Delivery: Inducing Sterile Inflammation in Macrophages. *Adv. Healthcare Mater.* **2021**, 2100385.
- 8) Nogueira SS et al. Polysarcosine-Functionalized Lipid Nanoparticles for Therapeutic mRNA Delivery. *ACS Applied Nano Materials* **2020**, 3 (11), 10634-10645.
- 9) Stéen EJJ et al. Trans-Cyclooctene-Functionalized PeptoBrushes with Improved Reaction Kinetics of the Tetrazine Ligation for Pretargeted Nuclear Imaging. *ACS Nano* **2020**, 2814(1), 568-584.