



## Personal Data

|                     |                                                              |
|---------------------|--------------------------------------------------------------|
| Title               | Dr. habil.                                                   |
| First name          | Martin                                                       |
| Name                | Humenik                                                      |
| Current position    | Group leader, Akad. Oberrat (permanent)                      |
| Current institution | Chair of Biomaterials, University of Bayreuth (UBT), Germany |
| ORCID               | 0000-0002-2097-8941                                          |

## Qualifications and Career

|                                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
|------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Degree programme                         | Diploma ( <b>2009</b> ) in Chemistry, Specialization: Organic Chemistry, P. J. Safarik University, Kosice, Slovakia                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| Doctorate                                | PhD ( <b>2005</b> ) at the Chair of Organic Chemistry, P. J. Safarik University, Kosice, Slovakia, Topic "Synthesis and biological activity of benzocamalexin derived N-Glycosides"                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| Stages of academic / professional career | <b>Since 2024</b> Academic Senior Councilor (Akad. Oberrat), University of Bayreuth, Chair of Biomaterials<br><b>2022:</b> Completed habilitation on the field Technology of macromolecular materials, Tomas Bata University, Faculty of Technology, Zlin, Czech Republic; Topic: "Technology of Chemical and Physical Processing of Proteins for Functional Surfaces"<br><b>Since 2009</b> Senior Researcher (Akad. Rat), University of Bayreuth, Chair of Biomaterials, Group leader "Hybrid Materials"<br><b>2005-2009:</b> Postdoc at University of Bayreuth, Chair of Biochemistry (Supervisor: Prof. M. Sprinzl); Topic on Lab-on-Chip development for bacterial detection, in cooperation with Siemens<br><b>2003-2005:</b> Research Assistant: Chair of Organic Chemistry, P. J. Safarik University, Kosice, Slovakia<br><b>2002-2003:</b> Marie Currie Fellowship at the Chair of Organic Chemistry, University of Milan, Italy, Group of Prof. Russo; Topic on synthesis and biological activity of CPS repeating unit of Neisseria meningitidis type A |

## Engagement in the Research System

|      |                                                                                                                          |
|------|--------------------------------------------------------------------------------------------------------------------------|
| 2024 | Summer school Biofabrication, co-organizer, UBT                                                                          |
| 2024 | Member of Bayreuth Graduate School of Mathematics and Natural Sciences, BayNAT, UBT                                      |
| 2023 | Member of American Chemical Society (ACS)                                                                                |
| 2020 | Member of the German Materials Society (DGM)                                                                             |
| 2019 | Member of SFB/TRR 225 Consortium Biofabrication                                                                          |
| 2016 | Lecturer in the Interdisciplinary Elite Study Program of Macromolecular Science within the Elite Network of Bavaria, UBT |



## Scientific Results

### Category A

- (1) Best, N.; Karabiyik, G.; Geerling, G.; Zwingelberg, S. B.; Lang, G.; **Humenik, M.** Aptamer-Based Delivery Systems for VEGF and NGF Modulation in Ocular Therapies. *Adv. Healthcare Mater.* 2026, 15 (23), e05182. <https://doi.org/10.1002/adhm.202505182>.
- (2) **Humenik, M.**; Scheibel, T. Nanostructured Protein Surfaces Inspired by Spider Silk. *Advanced Materials* **2025**, e08959. <https://doi.org/10.1002/adma.202508959>.
- (3) Kumar, L.; Nandan, B.; Sarkar, S.; König, T. A.; Pohl, D.; Tsuda, T.; Zainuddin, M. S.; **Humenik, M.**; Scheibel, T.; Horechyy, A. Enhanced Photocatalytic Performance of Coaxially Electrospun Titania Nanofibers Comprising Yolk-Shell Particles. *Journal of Colloid and Interface Science* **2024**.
- (4) Hovanová, V.; Hovan, A.; Žoldák, G.; Sedlák, E.; **Humenik, M.** Global Analysis of Kinetics Reveals the Role of Secondary Nucleation in Recombinant Spider Silk Self-Assembly. *Protein Science* **2023**, 32 (8), e4722.
- (5) Lamberger, Z.; Bargel, H.; **Humenik, M.** Aptamer-Modified Nanohydrogel Microarrays for Bioselective Cancer Cell Immobilization. *Advanced Functional Materials* **2022**, 32 (45), 2207270. <https://doi.org/10.1002/adfm.202207270>.
- (6) Heinritz, C.; Lamberger, Z.; Kocourková, K.; Minařík, A.; **Humenik, M.** DNA Functionalized Spider Silk Nanohydrogels for Specific Cell Attachment and Patterning. *ACS Nano* **2022**, 16 (5), 7626–7635. <https://doi.org/10.1021/acsnano.1c11148>.
- (7) **Humenik, M.**; Preiß, T.; Gödrich, S.; Papastavrou, G.; Scheibel, T. Functionalized DNA-Spider Silk Nanohydrogels for Controlled Protein Binding and Release. *Materials Today Bio* **2020**, 6, 100045. <https://doi.org/10.1016/j.mtbio.2020.100045>.
- (8) Molina, A.; Scheibel, T.; **Humenik, M.** Nanoscale Patterning of Surfaces via DNA Directed Spider Silk Assembly. *Biomacromolecules* **2019**, 20 (1), 347–352. <https://doi.org/10.1021/acs.biomac.8b01333>.
- (9) **Humenik, M.**; Scheibel, T. Nanomaterial Building Blocks Based on Spider Silk–Oligonucleotide Conjugates. *ACS nano* **2014**, 8 (2), 1342–1349. <https://doi.org/10.1021/nn404916f>.
- (10) **Humenik, M.**; Drechsler, M.; Scheibel, T. Controlled Hierarchical Assembly of Spider Silk–DNA Chimeras into Ribbons and Raft-Like Morphologies. *Nano Lett.* **2014**, 14 (7), 3999–4004. <https://doi.org/10.1021/nl501412k>.

### Category B

1. **Humenik, M.**; (2024) Self-assembling DNA-spider silk protein hybrids enable addressable interactions on nano and micro surfaces, ACS Spring 2024; New Orleans (Invited lecture)
2. **Humenik, M.**; (2023) Directed self-assembly of DNA-spider silk protein hybrids on surfaces; Silk Proteins and the Transition to Biotechnologies (Gordon Research Conference) Bryant University, United States
3. **Humenik, M.**; (2019) Functional hybrid nanostructures of DNA-spider silk conjugates, 6th International Conference on Multifunctional, Hybrid and Nanomaterials, Sitges, Spain (Invited lecture)



4. **Humenik, M.;** (2017) Hybrid spider silk nanostructures, XXVI International Materials Research Congress; Cancun, Mexico (Invited lecture)

### Academic Distinctions

2002-2003      Marie Curie Fellowship

### Other Information

Since 2018      Member of the interview committee of the international study program of Biofabrication, Faculty of Engineering, UBT

Since 2019      Member of international PhD defense committees (Trento, Italy; Melbourne, Australia; Stockholm, Sweden)

Since 2013      Coordination of practical Lab courses for students and school kids, Department of Biomaterials, UBT

### Current Projects

**2027–2032:** Project “[MB]<sup>2</sup> Multidimensional Biomaterials”, International Research Training Group Melbourne-Bayreuth, DFG GRK 3194

**2025-2027:** Project “Additive manufacturing of hierarchically structured 3D scaffolds for biomedical applications and bioanalytics (Bi3DAN)”, EFRE Bayern 2021-2027

**2025-2026:** Project “The Advanced Protein Biotechnology Consortium (APBC)”, Project code: 09102-03-V01-00021, Financed by Recovery and Resilience Plan of the Slovak Republic. In cooperation with Prof. Erik Sedlak, UPJS, Kosice, Slovakia

**2023-2026:** Interreg, 2021-2027, Projekt Nr. BYCZ01-39 AIIC, “ Antimikrobielle Beschichtungen nach dem Vorbild natürlicher Insektenprodukte. In cooperation with Prof. Michal Zurovec, BC CAS, Budweis, Zlin, Czech Republic.

**2023-2026:** AZV-CR (Grant Agency for Medical Research, Czech Republic), Projekt-Nr. NU23-08-00243, Topic: Functional replacements for nerve tissue regeneration prepared using advanced 3D printing techniques. Co-PI with Ing. Antonín Minařík, Ph.D., Tomas Bata University, Zlin, Czech Republic.