Curriculum Vitae

PERSONAL INFORMATION

Family name, First name:	Rainer Haag
Address, Nationality:	Stanzer Zeile 82, 14195 Berlin, German
Date of birth:	April 14, 1968
ORCID:	0000-0003-3840-162X
Current Affiliation:	Institute of Chemistry and Biochemistry, Freie Universität Berlin
URL for web site:	www.polytree.de

EDUCATION

1992 – 1995	Doctoral research with Prof. Armin de Meijere at the Georg-August-Universität Göttingen
1987 – 1992	Diploma in Chemistry at the Technical University Darmstadt and Göttingen (Germany)

CURRENT POSITION

Since 2004	Chair Professor of Organic and Macromolecular Chemistry, Institute of Chemistry and Biochemistry at the Freie Universität Berlin

PREVIOUS POSITIONS

06-08 2014	Visiting professor, McGill University, Montreal (Canada) with Prof. Gerd Multhaup and University of British Columbia, Vancouver (Canada) with Prof. Don Brooks
06-08 2009	Visiting professor, Harvard University, Cambridge (USA), with Prof. David Weitz
2003 – 2004	Associate Professor of Organic Polymer Chemistry, Universität Dortmund
1999 – 2002	Group Leader and Habilitation at Freiburg Materials Research Center and Institute for Macromolecular Chemistry, Universität Freiburg
1997 – 1999	Research associate in the Department of Chemistry, Harvard University, Cambridge, Massachusetts (USA) with Prof. George M. Whitesides
1996 – 1997	Postdoctoral fellow at the Chemical Laboratory, University of Cambridge (England) with Prof. Steven V. Ley

FELLOWSHIPS AND AWARDS

2019	Elected Member of the National Academy of Technical Sciences (acatech)
2016	Innovation Award Berlin-Brandenburg with the startup DendroPharm
2015	SupraFAB research building (granted by the German Research Council)
2014	Teaching Award for the concept “Translation of Project Ideas”, Freie Universität Berlin
2014	Honorary Lifetime Fellow of the Indian Society of Biology and Chemistry
2010	Arthur Doolittle Award of the American Chemical Society (ACS)
2004	Nanoscience Award for Young Scientists of the Ministry of Science (BMBF)
2003	Early Career Award of the German Chemical Industry (VCI)
2002	Heinz Maier-Leibnitz Prize of the German Science Foundation (DFG)
2001	Reimund Stadler Prize of the GDCh Division of Macromolecular Chemistry
2000	ADUC Habilitation Award of the German Chemical Society (GDCh)
1997	Selected Member of the Study Foundation of the German People

SUPERVISION OF GRADUATE STUDENTS AND POSTDOCTORAL FELLOWS

1999 – 2020	>60 Postdocs, >70 PhD students, and 75 masters and diploma students at three universities

TEACHING ACTIVITIES

Since 2005	Polymer science class, Freie Universität Berlin, Germany
Since 2000	Diverse lectures and courses in organic chemistry (see Teaching section of web site)

Summary of own Research, Ten-year track record

I am chair professor in Organic and Macromolecular Chemistry at Freie University Berlin (FU Berlin), where I head a highly diverse and multidisciplinary 50-member research group (www.polytree.de). I co-initiated the "Nanoscale" focus area (www.nanoscale.fu-berlin.de) to coordinate interdisciplinary research between biology, chemistry, and physics on our campus, resulting in 2021 in the new SupraFAB research building (www.suprafab.fu-berlin.de). Based on my experience in the lab of George Whitesides at Harvard University, I conceived the first Collaborative Research Center on Multivalency as a Chemical Organization and Action Principle (www.sfb765.de), which was funded by the German Science Foundation for a period of 12 years through the end of 2019, with an annual budget of € 2.0 Mio. I am currently the spokesperson for the new Collaborative Research Center "Dynamic Hydrogels at Biological Interfaces" (www.sfb1449.de), with a team of 20 independent research groups and four years of funding at € 11.5 Mio. In addition to this key topic, my group's work focuses on biomacromolecular systems and biointerfaces. My team initially mimicked a liposome on the molecular level and created core-multishell nanocarriers, winning a € 1.5 Mio NanoFutur award from the Ministry of Science. These nanocarriers, now used for transdermal drug delivery into the ears of cats, also won the 2016 Innovation Award Berlin-Brandenburg for the FU Berlin-founded startup Dendropharm. Meanwhile, my group has developed a broad platform of bioinert polyglycerol scaffolds of different shapes and sizes, allowing us to mimic biological functions and validate engineered macromolecular systems for many diagnostic, therapeutic, and surface applications. After a 2009 sabbatical with David Weitz of Harvard University, I also entered the field of microfluidics for bioanalytics and microgel formation. In 2022, I was awarded an ERC advanced grant "SupraVir" € 2,85 Mio to study supramolecular virus inhibitors.

Top 10 Publications (selected from over 630 peer-reviewed publications as of 06/2023)

Our research has led to **over 630 peer-reviewed publications,** which have been cited by over 35,000 articles (excluding self-citations) and over 45 patent applications (with 10 granted patents). My current **h-index is 92** (Google Scholar) with an **academic age of 30 years**.

1. C. Nie, P. Pouyan, D. Lauster, J. Trimpert, Y. Kerkhoff, G. P. Szekeres, M. Wallert, S. Block, A. K. Sahoo, J. Dernedde, K. Pagel, B. B. Kaufer, R. R. Netz, M. Ballauff, **R. Haag**, Polysulfates block SARS-CoV-2 uptake via electrostatic interactions. *Angew. Chem. Int. Ed.* 2021;60:15870. (Impact factor: 15.3)
2. C. Nie, M. Stadtmüller, B. Parshad, M. Wallert, Y. Kerkhoff, S. Bhatia, S. Block, C. Cheng, T. Wolff, **R. Haag**, Heteromultivalent topology-matched nanostructures as potent and broad-spectrum influenza A virus inhibitors. *Sci. Adv.* 2021;7:eabd3803. (Impact factor: 14.1)
3. X. Fan, F. Yang, C. Nie, L. Ma, C. Cheng, **R. Haag**, Biocatalytic Nanomaterials: A New Pathway for Bacterial Disinfection *Adv. Mater.* 2021;33:2100637. (Impact factor: 30.9)
4. C. Nie, B. Parshad, S. Bhatia, C. Cheng, M. Stadtmüller, A. Oehrl, Y. Kerkhoff, T. Wolff, **R. Haag**, Reverse design of an influenza neutralizing spiky nano-inhibitor with a dual mode of action. *Angew. Chem. Int. Ed.* 2020:59, 15532. (Impact factor: 15.3)
5. S. Bhatia, M. Hilsch, J. L. Cuellar Camacho, K. Ludwig, C. Nie, B. Parshad, M. Wallert, S. Block, D. Lauster, C. Böttcher, A. Herrmann, **R. Haag**, Adaptive flexible sialylated nanogels as highly potent influenza A virus inhibitors. *Angew. Chem. Int. Ed.* 2020; 59:12417. (Impact factor: 15.3)
6. M. S. Chowdhury, W. Zheng, S. Kumari, J. Heyman, X. Zhang, P. Dey, D. Weitz, **R. Haag**, Dendronized fluorosurfactant for highly stable water-in-fluorinated oil emulsions with minimal inter-droplet transfer of small molecules. *Nat. Commun.* 2019;10:4546. (Impact factor: 14.9)
7. C. Cheng, S. Li, A. Thomas, **R. Haag**, et al. Water-Processable and Bioactive Graphene Nano-Ink for Flexible Bio-Electronics. *Adv. Mater.* 2018;30:1705452. (Impact factor: 30.9)
8. Z. Qi, P. Bharate, C.H. Lai, B. Ziem, C. Böttcher, A. Schulz, F. Beckert, B. Hatting, R. Mulhaupt, P.H. Seeberger, **R. Haag.** Multivalency at Interfaces: Supramolecular Carbohydrate-Functionalized Graphene Derivatives for Bacterial Capture, Release, and Disinfection. *Nano Lett.* 2015;15:6051. (Impact factor: 11.2)
9. J. Vonnemann, S. Liese, C. Kuehne, K. Ludwig, J. Dernedde, C. Böttcher, R.R. Netz, **R. Haag.** Size Dependence of Steric Shielding and Multivalency Effects for Globular Binding Inhibitors. *J. Am. Chem. Soc.* 2015;137:2572. (Impact factor: 15.4)
10. Q. Wei, T. Becherer, P.-L. M. Noeske, I. Grunwald, **R. Haag.** A Universal Approach to Crosslinked Hierarchical Polymer Multilayers as Stable and Highly Efficient Antifouling Coatings. *Adv. Mater.* 2014;26:2688. (Impact factor: 30.9)

5 Selected Granted Patents

1. S. Bhatia, M. Schirner, R. Haag, "Heteromultivalent polymers and antiviral applications thereof". EU Patent application 2023, EP 23165569.7
2. A. Herrmann, S. Bhatia, D. Lauster, R. Haag, "Linear and hyperbranched polyglycerol based multivalent sialosides as influenza virus inhibitors". German Patent 2016, 16 153 144.7
3. R. Haag, S. Reimann, J. Dernedde, "Shell Cleavable Dendritic Polysulfates Show High Anti-Inflammatory Properties by Inhibiting the L-Selectin-Binding and Complement-Activation". German Patent 2015, DE 102015206819.
4. R. Haag, D. Steinhilber, W. Frieß, S. Hedtrich, M. Witting, "Method for Producing a Polyglycerol Nanogel for Encapsulation and Release of Biologically Active Substances". EP2892642 published 15.07.2015 and US14426713 published 08.10.2015
5. R. Haag, M. Radowski, "Nanotransport system having a dendritic architecture" German Patent 2004, DE-102004 039875, 2005, PCT / EP 2005 008918 / WO 2006 018295

Invited presentations to internationally established conferences and international advanced schools

I have given over **85 invited presentations** at conferences, workshops and departments. The following list is a selection of my invited, keynote, and plenary talks at international conferences:

2019	Gordon Research Conference on Drug Delivery, Vermont (USA)
2018	Gordon Research Conference on Biomacromolecular Systems, Diablerets (Switzerland)
2017	ICMSE International Conference on Molecular Systems Engineering, Basel (Switzerland)
2017	International Conference NanoBioMater, Bad Herrenalb (Germany)
2016	From Molecules to Functional Materials, MPI Polymer Chemistry Symposium, Mainz
2016	PMSE Symposium, American Chemical Society national meeting, Philadelphia (USA)
2016	European Symposium on Controlled Drug Delivery, Egmond aan Zee (Netherlands)
2016	Winter School of the Nanosystems Initiative Munich, Kirchberg (Austria)
2015	European Polymer Congress, Dresden (Germany)
2013	International Symposium, Advances in Synthetic and Medicinal Chemistry, Moscow (Russia)
2013	Danish Society Symposium, Odense (Denmark)
2012/14/16/18	Symposia on Innovative Polymers for Controlled Delivery, Suzhou (China)
2012	Controlled Release Society of Israel, Meeting on Polymer Therapeutics, Tel Aviv (Israel)
2011	Materials Research Society, meeting on multi-functional polymers, Boston (USA)
2011/13/14/15	Indian Chemical Society meetings, Delhi University (India)
2012	International Conference on Chemistry for Health, Athens (Greece)
2011	Advanced Functional Polymers for Medicine, Twente (Netherlands)
2011	Materials Research Society Symposium, Boston (USA)
2010/12	International Symposium on Polymer Therapeutics, Valencia (Spain)
2009/15	International Dendrimer Symposia, Toulouse, Stockholm and Montreal

Major contributions to the early careers of excellent researchers

When I was appointed to the Chair of Organic and Macromolecular Chemistry at the Freie Universität Berlin (FU Berlin), only a few junior research groups existed within the institute. Over the last 15 years, I recruited and mentored the leaders of six junior research groups that received their independent funding soon after starting in our department: Prof. Christian Hackenberger (chemical biology), now full professor at FMP/Humboldt University of Berlin; Prof. Marcelo Calderon, now professor at Polymat, San Sebastian in Spain (thermoresponsive nanogels); Prof. Marie Weinhart, now professor at the University of Hanover (macromolecular surface engineering); Dr. Stephan Block of FU Berlin (biophysical methods for biomacromolecular interaction); Dr. Sumati Bhatia of FU Berlin (multivalent bacterial inhibitors); and Dr. Daniel Lauster of FU Berlin (mucolytic peptides). In 2013 I chaired a search committee for a young female professor of biomaterial analysis (Nan Ma), and in 2014 for a joint female junior professorship in macromolecular chemistry together with the Federal Institute for Materials Research and Testing (BAM). My main initiative has been to broaden the field of biomacromolecular and supramolecular chemistry, and together with my physics colleague Stephanie Reich I initiated the Nanoscale Functional Materials focus area (www.nanoscale.fu-berlin.de), now the most successful research hub at Freie Universität Berlin. Under my leadership, in 2015 our team was awarded a new transdisciplinary research building, SupraFAB, that includes a unique interdisciplinary environment for five independent junior research groups. Within this new research infrastructure, I hope to strengthen diversity in science and continue supporting talented young researchers.

Ongoing grants and funding of the PI (Funding ID)

Project Title	Funding Source	Amount (Euros)	Period	Role of the PI	Information
ERC Advanced Grant SupraVir:	ERC	2,850,000	2022-2027	Project leader	Focus on supramolecular polymers
Fluorine-Specific Interactions: Fundamentals and Functions	DFG (SFB 1349)	400,000	2019-2026	Project leader	Supramolecular fluorophilic nanosystems
Dynamic Hydrogels at Biointerfaces	DFG (SFB 1449)	450,000 out of 11,200,000	2021-2024	Spokes-person and project leader	Mucus-mimetic polymers and hydrogels
Research Building SupraFAB	BMBF	18,800,000 Total with Berlin part: 48,000,000	2015-2022	Key applicant	Research infrastructure grant
International Research Training Group "Charging into the Future: Understanding the interaction of polyelectrolytes with biosystems"	DFG (GRK2662)	1,840,000	2021-2025	Spokes-person and project leader	Polyanionic and polycationic dendritic nanaosystems
ArthroGlide (Hydrogels against Arthritis)	BMBF	720,041	2021-2024	Project leader	Mimicry of the synovial fluid in the knee
Pathoclear (Development of biofunctional filter material for medical respiratory protection)	BMBF	151,638	2021-2022	Project leader	New textiles for SARS-CoV-2 binding
Flowclear (Filter materials for bacteria removal)	AiF	150,000	2022-2024	Project leader	Filter materials against bacteria
NoVirall	Federal Ministry for Economic Affairs and Energy	946,102	2022-2023	Project leader	Virucidal filter surface scaffolds for SARS-CoV-2 binding and removal

DFG: German Science Foundation; BMBF: German Ministry of Science and Education, AiF: Arbeitsgemeinschaft industrieller Forschungsvereinigungen (industrial research fund)