

Ronald MICURA

born 1970 in Linz (Austria)

*Professor for Organic Chemistry
and Chemical Biology*
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Main Areas of Research: Ribonucleic acids (RNA chemistry, RNA biophysics, RNA biochemistry)

Education and Professional Experience

since 2008	Full Professor for Organic Chemistry
2007	Offer of a Professorship Bioorganic Chemistry (Full Professor), Institute of Organic Chemistry, University of Linz (Austria), declined
2004 – 2008	Full Professor (non-tenure) for Organic Chemistry, Institute of Organic Chemistry, University of Innsbruck
2002	Habilitation in Organic Chemistry, Institute of Organic Chemistry, University of Innsbruck
2002 – 2004	Group leader, Institute of Organic Chemistry, University of Innsbruck, Austria
1999 – 2002	Group leader at the Universität Linz, Academic Guest at ETH Zürich (Switzerland) and The Scripps Research Institute (CA, USA)
1996 – 1998	Postdoctoral research fellow with Professor Albert Eschenmoser at ETH Zürich (Switzerland) and The Scripps Research Institute (CA, USA)
1993 – 1995	Doctoral research and Dr. tech. in Organic Chemistry (supervisor: Professor Karl Grubmayr), University of Linz (Austria)
1993	Diploma in Chemistry, University of Linz (Austria)
1988 – 1993	Studies of Chemistry at the University of Linz (Austria)

Professional Activities

since 2013, and 2005-2008	Head of the Institute of Organic Chemistry, University of Innsbruck
since 2008	Deputy director of the Center for Molecular Biosciences Innsbruck (CMBI) http://www.uibk.ac.at/cmbi
2008-2017	Board member of the Austrian Science Fund FWF (Reporter for Organic Chemistry; <i>Kuratorium</i>)

Reviewer for **science agencies** (e.g. Deutsche Forschungsgemeinschaft DFG, SNF (Switzerland), INSERM-cnrs (France), ANR (France), NWO (The Netherlands) and **science journals** (J Am Chem Soc, Angew Chem Int Ed, Nature, Nat Chem Biol, Nat Chem, Nat Commun, Nat Methods, Nat Struct Mol Biol, Proc Natl Acad Sci USA, Nucleic Acids Res, Chemistry Eur J, Chem Comm, Chem Sci, ACS Chem Biol, RNA, RNA Biol, etc.)

Honors, Awards, Scientific Achievements, Fellowships

since 2011	Full Member of the Austrian Academy of Sciences (corresponding member 2008 – 2011)
2005	Ignaz L. Lieben Award (Austrian Academy of Sciences)
2003	Novartis Award for Chemistry
2003	JSP Bürgenstock Fellowship
1999 – 2002	APART fellowship (Austrian Academy of Sciences)
1996 – 1998	Erwin Schrödinger fellowship (Austrian Science Fund FWF)
1996	PhD Thesis Award (Austrian Chemical Society, GÖCH)

Editorships

Chemistry – A European Journal; ChemBioChem; ChemPlusChem; Chemical Monthly (Editorial Advisory Boards)

Publications

WebOfScience (September 2018): >120 publications, citations >3728 (>3216 without self-citations), average citations per item 28.9, h-index 36; Google Scholar: citations: > 5080, h-index 42; see also <https://www.uibk.ac.at/organic/micura/publications/>

Five most important research projects funded (last five years)

2017 – 2021	FFG R&D Infrastructure Funding (“RNA Hot-Spot”: High-end NMR equipment for structural chemistry to explore biomolecules and interactions with small-molecule ligands (for 400&700 MHz NMR instrumentation)
2016 – 2019	Austrian Science Fund FWF; project P27947 'Chemical synthesis of modified twister ribozymes'
2013 – 2017	National Science Foundation NSF and Austrian Science Fund FWF; International Collaboration in Chemistry (ICC) I1040 'Single-molecule FRET investigations of riboswitch-mediated translational control'
2010 – 2015	Austrian Science Fund FWF-project P21641, 'Synthesis of RNA-peptide conjugates – acylated tRNA mimics'

Five most important international key collaborations (for joint publications see: <http://rna.micura.at>)

Prof. **Scott C. Blanchard**, Weill Cornell Medical College, NY, USA (collaboration on smFRET); Prof. **Dinshaw J. Patel**, MSKCC, NY, USA (collaboration on structural biology of RNA and RNA complexes); Prof. **Marat Yusupov**, IGBMC, Strasbourg, France (collaboration on RNA-peptide conjugates to study ribosomal complexes); Prof. **Eric Ennifar**, CNRS Strasbourg, France (collaboration on X-ray crystallography of small nucleic acids); Dr. **Aiming Ren**, Zhejiang University, China (collaboration on RNA structural biology)

Ten most important invitations (last ten years)

- 'Mechanistic aspects of recently discovered ribozyme classes'; *7th Cambridge Symposium on Nucleic Acids Chemistry and Biology*, 3.9.-6.9.2017, Cambridge, United Kingdom.
- 'Chemically modified RNA to explore riboswitch and ribozyme function'; *6th EuCheMS Chemistry Congress*; topic plenary lecture, 11.9.-16.9.2016, Sevilla, Spain.
- 'Chemically modified RNA to explore riboswitch and ribozyme function'; *22th International Round Table on Nucleosides, Nucleotides and Nucleic Acids (XXII IRT)*; 18.07.-22.07.2016, Paris, France.
- 'Modifying RNA to explore riboswitch and ribozyme function'; *The Epi-transcriptome, EMBL Conference*, 20.4.-22.4.2016, Heidelberg, Germany.
- 'Chemistry and Biophysics of mRNA Riboswitches', *Gordon Research Conference on RNA Editing and Modification*, 8.3-13.3.2015, Il Ciocco, Italy.
- 'The dynamics of RNA as key to understanding gene regulation mediated by mRNA riboswitches'; 26.9.-30.9.2012, *Chemical Biology 2012, EMBL Conference*, Heidelberg, Germany.
- 'Synthetic modified RNA – Probes to Study Riboswitch and Ribosome Function'; 16.11.2012, *IOCB Invited Lectures*, Czech Academy of Science, Prague, Cech Republic.
- 'Ligand Recognition of Riboswitches'; 5.6.-10.6.2011, *XVth Symposium on Chemistry of Nucleic Acid Components*, Cesky Krumlov, Cech Republic.
- 'Synthetic Manipulation of RNA: On Riboswitch Folding and Ribosome Mechanisms'; 12.4.2011, *University of California, Berkeley* - Department of Chemistry, Berkeley, USA
- 'Synthesis of Non-Hydrolyzable 3'-Peptidyl-tRNA Conjugates'; 3.5.-7.5.2010, *Ribosomes 2010*, Orvieto, Italy.

Ten Most Important Publications (*Google Scholar citations 09-2018*)

10. C. Riml, T. Amort, D. Rieder, C. Gasser, A. Lusser, **R. Micura**; 'Osmium-mediated 4sU-to-C transformation as key to study RNA dynamics by sequencing (TUC-seq)'; *Angew. Chem. Int. Ed.* **2017**, *56*, 13479-13483.

This work introduces a novel RNA sequencing approach to explore cellular RNA dynamics via metabolic labeling and chemical nucleoside conversions; see News&Views by M. A. P. Baptista, L. Dölken. Nat. Methods 2018,15, 171-172.

9. S. Neuner, C. Falschlunger, E. Fuchs, M. Himmelstoss, A. Ren, D.J. Patel, **R. Micura**; 'Atom-specific mutagenesis reveals structural and catalytic roles for active site-adenosine and Mg²⁺ in pistol ribozyme'; *Angew. Chem. Int. Ed.* **2017**, *56*, 15954-15958.

This work reveals the chemical mechanism of the 2015 discovered ribozyme.

8. M. Frener, **R. Micura**; 'Conformational rearrangements of individual nucleotides during RNA-ligand binding are rate-differentiated'; *J. Am. Chem. Soc.* **2016**, *138*, 3627-3630.

This work reveals the unexpected, large rate differentiation of RNA conformational adaptations during induced-fit ligand recognition.

7. M. Kosutic, S. Neuner, A. Ren, S. Flür, C. Wunderlich, E. Mairhofer, N. Vusurovic, J. Seikowski, K. Breuker, C. Höbartner, D.J. Patel, C. Kreutz, **R. Micura**; 'A Mini-Twister Variant and Impact of Residues/Cations on the Phosphodiester Cleavage of this Ribozyme Class'; *Angew. Chem. Int. Ed.* **2015**, *54*, 15128-15233. (29 citations)

This work reveals the chemical mechanism of the 2014 discovered ribozyme.

6. M. Kosutic, L. Jud, C. Da Veiga, M. Frener, K. Fauster, C. Kreutz, E. Ennifar, **R. Micura**; 'Surprising base pairing and structural properties of 2'-trifluoromethylthio-modified RNA'; *J. Am. Chem. Soc.* **2014**, *136*, 6656-6663. (19 citations)

This work demonstrates the wide applicability of a novel NMR label that was originally introduced by our group in 2012.

5. A. Haller, R. B. Altman, M. Soulière, S. C. Blanchard, **R. Micura**; 'Folding and ligand recognition of the TPP riboswitch aptamer at single-molecule resolution'; *Proc. Nat. Acad. Sci. USA* **2013**, *110*, 4188-4193. (72 citations)

This work reveals remote dynamic coupling of structural subunits of a folded RNA for the first time.

4. K. Fauster, M. Hartl, T. Santner, M. Aigner, C. Kreutz, K. Bister, E. Ennifar, **R. Micura**; 2-Azido RNA, a Versatile Tool for Chemical Biology: Synthesis, X-ray Structure, siRNA Applications, Click Labeling; *ACS Chem. Biol.* **2012**, *7*, 581-589. (88 citations)

3. M. Soulière, A. Haller, R. Rieder, **R. Micura**; 'A powerful approach for the selection of 2-aminopurine substitution sites to investigate RNA folding'; *J. Am. Chem. Soc.* **2011**, *133*, 16161-16167. (36 citations)

This work demonstrates that SHAPE probing is most powerful to select suitable positions for labeling without knowledge of the three-dimensional RNA structure.

2. A. Haller, U. Rieder, M. Aigner, S. C. Blanchard, **R. Micura**; 'Conformational capture of the SAM-II riboswitch'; *Nat. Chem. Biol.* **2011**, *7*, 393-400. (131 citations)

1. R. Rieder, K. Lang, D. Graber, **R. Micura**; 'Ligand-Induced Folding of the Adenosine Deaminase A-Riboswitch and Implications on Riboswitch Translational Control'; *ChemBiochem* **2007**, *8*, 896-902. (161 citations)

This work introduces a fluorescence spectroscopic approach (2APfold) to disclose ligand-induced conformational changes of single nucleotides within large RNA folds and to reveal the underlying kinetic parameters (exemplified for riboswitches).