

Annette H. Erbse, Ph.D.

Director of the Biochemistry Shared Instruments Pool • Director of the Macromolecular X-Ray Core

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Professional Career:

- 2016-present **Director of the Macromolecular X-ray core in the Department of Chemistry and Biochemistry**, JSC Biotechnology Building, University of Colorado at Boulder
Responsibilities: Training and supervision of users; radiation license, trouble shooting of experiments and instruments, instrument maintenance; organisation and support of data collection at synchrotrons, administration and accounting for the core
- 2012-present **Director of the Shared Instrument Core in the Department of Chemistry and Biochemistry**, JSC Biotechnology Building, University of Colorado at Boulder
Responsibilities: Training and supervision of users; support in project development, experimental design, optimisation and evaluation; trouble shooting of experiments and instruments, instrument maintenance; lead in shared instrument grant proposals; service measurements for in house and commercial users; administration and accounting for the core
- 2009-2012 **Senior Research Associate**, University of Colorado, Boulder in the group of Prof. J.J.Falke., Boulder, CO, USA
Research project: Investigating the mechanisms of bacterial chemotactic signal sensing
- 2009-present **Manager EPR facility** Department of Chemistry/Biochemistry, University of Colorado – Boulder, Boulder, CO, USA
- 2006-2009 **Research Associate**, University of Colorado, Boulder in the group of Prof. J.J.Falke, Boulder, CO, USA
Research project: Investigating the mechanisms of bacterial chemotactic signal sensing
- 2002-2005 **Oberassistent (Senior Staff Scientist)** at the Centre for Molecular Biology, University of Heidelberg in the group of Prof. B. Bukau, Heidelberg, Germany
Research project: Function and mechanism of molecular chaperons in proteolysis
- 1999-2002 **Post-doctoral Fellow** of the Howard Hughes Medical Institute at Yale University in the group of Prof. A. L. Horwich, New Haven, CT, USA
Research Project: Investigating the structure of TTR amyloid-fibers using EPR-spectroscopy
- 1996 -1999 **Research Associate**, Department of Biological Sciences, University of Birmingham in the group of Dr. P. A. Lund, Birmingham, England

Research project: Function and mechanism of molecular chaperons of the HSP60 family

Education:

- October 1996 **PhD** at the Department of Chemistry, University of Kaiserslautern, Germany
- 1993 – 1996 **PhD student** in the group of Prof. W. Trommer und Dr. P. Vogel at the Department of Chemistry, University of Kaiserslautern, Germany
- Thesis project: Investigating the structure – function relationship of different ATP binding proteins employing EPR-spectroscopy
- February 1993 **Diploma in Chemistry** at the University of Kaiserslautern, Germany (equivalent to **Masters** in the USA)
- 1992 – 1993 **Diploma Thesis** (equivalent to **Masters Thesis**) at the University of Kaiserslautern, Department of Chemistry in the group of Prof. W. Trommer
- Thesis project: Kinetic investigations on native and activated F₁-ATPase from chloroplasts
- 1986 – 1992 Chemistry student at the Department of Chemistry at the University of Kaiserslautern, Germany

Expertise:

- Developing biophysical/biochemical assays for the analyses of protein, DNA and RNA structure and function.
- Protein, DNA and RNA characterization. SDS gel-electrophoresis, western blotting, activity assays, mass spectrometry, Fluorescence- and EPR spectroscopy, calorimetric assays, circular dichroism, dynamic and static multi angle light scattering, microscale thermophoresis.
- Enzyme kinetics and thermodynamics. Coupled activity assays, radioactive labelled substrates, different spectroscopic methods (EPR, fluorescence, FRET, anisotropy, UV-VIS) in steady-state or stopped-flow experiments), SPR (Biacore), HD exchange, peptide libraries, fast kinetics (stopped-flow and chemical quench flow), Isothermal Titration Calorimetry, Microscale Thermophoresis, investigation of cooperativity and analyses of data by applying mathematical models.
- Macromolecular X-ray Crystallography
- Protein mass spectrometry. MALDI and ESI-LC/MS, MS/MS, accurate total mass determination, peptide fingerprinting, PDS, Instruments: ABI Q-Star Pulsar, Bruker Ultraflex MALDI-TOF/TOF and Voyager-DE™ STR). Mass spectrometry teaching: Co-developed and team-taught a graduate mass spectrometry hands-on/theory class with Dr. M.M. Mayer (Center for Molecular Biology Heidelberg).
- Expression and purification of recombinant proteins. Purification employing HPLC und FPLC methods (gel filtration, ion exchange -, reversed-phase- and affinity chromatography), purification from inclusion bodies, purification of radioactively labelled proteins.
- Developing structure/function guided protein mutations.
- Protein modification. Site-specific biotinylation, PEGylation, spin labelling or fluorophore conjugation employing designed, structure/function guided cysteine mutants via maleimide, succinimide, disulfide chemistries, genetically encoded affinity tags, enzymatic modification and chemical modification.
- Isolation of membrane fractions, inner membrane vesicles, trans-membrane receptors and membrane-bound, multi-protein complexes in native membranes.
- Molecular biology (sub-cloning, mutagenesis, constructing fusion proteins).