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Biomolecular Sciences
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Research summary:
My research is focused on conformational dynamics and its importance for the function of enzymes, proteins that interact with other proteins and proteins that aggregates/fibrillates. In all cases the aim is to understand the conformational changes of the proteins in such detail that their behaviour can be rationalized and eventually manipulated. Recent highlights include: Structure and dynamics of the endogeneous capsid protein Arc (paper 49). How the dynamics of metal-ions in Ab and a-synuclein is important for the formation of ROS (papers 45, 38, 34 and 21); ligand binding to a neurotransmitter-sodium symporter by solid-state NMR (paper 40); the design of a stable protein devoid of charges (paper 37,48,54,63); the structure and interactions of PDZ domain proteins (paper 33,35,53,65); specificity and dynamics in ligand binding by glutaredoxin (papers 31 and 22); conformational dynamics and stability in the fold switching protein NCBD (papers 29,27,25,19); optimization of protein stability (papers 51,57,61,62,64,68).

Employments:
2022- Professor, Department of Biology, University of Copenhagen.
2011-22: Associate Professor, Department of Biology, University of Copenhagen.
2007-10: Assistant Professor, Department of Biology, University of Copenhagen.
2004-07: Post doc., Department of Biophysical Chemistry, Lund University.
2002-03: Post doc., Department of Protein Chemistry, University of Copenhagen.
2001: Visiting scientist, Institute for Cancer Research, Fox Chase Cancer Center, USA.
1999-02: PhD student, Department of Protein Chemistry, University of Copenhagen.
1998-99: Research assistant, Carlsberg Laboratory, Department of Chemistry.
1997-98: Research assistant, Department of Protein Chemistry, University of Copenhagen.

Education:
2002: PhD in protein science, University of Copenhagen.
Thesis: "*Intermediate and Unfolded States in the Folding of Acyl-Coenzyme A Binding Protein*". Supervisor: Professor Flemming M. Poulsen
1997: cand. scient. (MSc) in biochemistry, University of Copenhagen.
Thesis: "*Expression and in vitro folding of barly peroxidase 1 & Deglycosylation studies on horseradish peroxidase*". Supervisor: Associate Professor Karen G. Welinder.

Major grants and fellowships:
Total 22 grants, 16 as PI. Total personal share of grants: ~38 M DKK
2023-26:Project grant, The Danish Council for Independent Research, PI. 2.9 M DKK
2023-26:Project grant, the Novo Nordisk Foundation, PI, 3.7 M DKK
2022-25:Project grant, the Novo Nordisk Foundation, PI, 2.7 M DKK
2020-23:Project grant, The Danish Council for Independent Research, PI. 2.9 M DKK
2019-24:NMR Infrastructure grant, the Novo Nordisk Foundation, co-PI, 23.4 M DKK
2019-21:Project grant, Independent Research Fund Denmark, FSS, PI, 1.4 M DKK
2018-21:Project grant, Independent Research Fund Denmark, FNU, PI, 2.6 M DKK
2018-20:Project grant, the Novo Nordisk Foundation, PI, 1 M DKK
2016-17:Running costs, the Lundbeck Foundation, PI, 0.3 M DKK
2016:Instrument grant, the Augustinus Foundation, PI, 0.2 M DKK
2016-18:Project grant, the Novo Nordisk Foundation, co-PI, 2.8 M DKK
2014:New NMR instrumentation, The Villum Foundation, co-PI, 12 M DKK
2014-16:Project grant, the Lundbeck Foundation. PI, 1 M DKK
2013-16:Project grant, The Danish Council for Independent Research, PI. 1.9 M DKK
2012-14:Project grant from The Danish Council for Independent Research | Technology
Co-applicant. 5.4 M DKK
2011-13:Villum Foundation block grant. Co-applicant. approx. 1.1 M DKK
2011-13:Project grant from the Lundbeck Foundation. PI, 1 M DKK
2011-12:Project grant from The Danish Council for Independent Research | Medical Sciences. PI, 2 M DKK
2007-10:Steno-grant from the Danish Natural Science Research Council. PI 2.7 M DKK
2005-06:EMBO Long Term Fellowship.
2004-05:Villum Kann Rasmussen postdoctoral fellowship.
1999-02:PhD scholarship from the Science Faculty, University of Copenhagen.

Management and organizational work:
I have headed my own research group since 2008.
2023- Deputy Head of Department (teaching), Dept. Biology, Uni. of Copenhagen
2023- Chair of DANEMO - support office for the Danish membership of EMBL and EMBO
2020-23: Delegate at the EMBL and EMBC councils.
2016-22: Head of Section for Biomolecular Sciences, Dept. Biology, Uni. of Copenhagen
2016: Local organizer of the EUROMAR 2016 conference, Århus, Denmark
2015: The art of leadership, EMBO, Heidelberg
2006: Laboratory Management Course, EMBO
1995-97:Member of the Board, Institute of Molecular Biology, University of Copenhagen.

Students since 2007
Number of PhD students:9 graduated. 3 active
Number of master students:26 graduated

Collaborations:
I am engaged in and has been the driving force for several collaborative projects including both local, industrial and international collaborators. Recent international collaborations include: Conformational heterogeneity of the industrial enzyme Savinase with the group of Professor Keith S. Wilson, University of York. Assembly of capsids of domesticated Gag proteins with Michael Landreh, Karolinska Institute. Phosphate recovery with bacterial phosphate binding proteins. Upfront Chromatography A/S.

Talks:
Intermediate and unfolded states in the folding of Acyl-Coenzyme A binding protein, 2004, Lund University, Sweden
Protein folding kinetics by relaxation dispersion measurements, 2005, University College Dublin, Ireland
Protein folding kinetics by relaxation dispersion measurements, 2005, Tällberg, Sweden
NMR relaxation reveals quiet states in protein folding, Symposium in the honor of Professor Flemming M. Poulsen's 60th birthday, 2006, Copenhagen, Denmark
Transient structural transitions as a gateway to protein misfolding, NMR-life workshop, 2007, Copenhagen, Denmark
Transient structural transitions as a gateway to protein misfolding, 2008, University of Groningen, Holland
Characterization of Transient Structural Distortion of SOD1 implicated in amyotrophic lateral sclerosis, 2009, Copenhagen, Denmark
Sod it! It oligomerizes – Misfolding of SOD implicated in amyotrophic lateral sclerosis, Mini-symposium on Protein Aggregation, 2009, Lund, Sweden
Seeing the invisible – Characterizing transient protein structures by NMR spectroscopy, Workshop on protein structure, 2011, Technical University of Denmark
Protein dynamics by NMR spectroscopy, 2011, Novozymes A/S, Denmark
NCBD – a malleable and ordered protein, 33rd Danish NMR meeting, Aarhus, Denmark.
Transient secondary structure accelerates the binding of ACTR to NCBD. CECAM workshop on Intrinsically disordered proteins, 2013, Zurich, Switzerland.
The Dielectric Constant of Proteins Determined from NMR Chemical Shift Perturbations, 2014 University of Aarhus.
Dynamics in the molten-globule like protein NCBD and its interaction with the disordered ligand ACTR. 2015, University of Cambridge.
Dynamics in the molten-globule like protein NCBD and its interaction with the disordered ligand ACTR. 2015, 1st symposium of the Linderstrøm-Lang Center
Secondary structure as a driver for protein-protein interactions involving IDP's. Protein Interactions Workshop, 2016, Technical University of Denmark.
High-throughput generation of stabilized protein variants. Benzon Symposium 63 – New Paradigms of Protein Engineering, 2018, Copenhagen, Denmark
Arc – an old protein that learned new tricks. 2018, University of Aarhus.
Arc – a domesticated retroviral Gag protein. 40rd Danish NMR meeting, 2019, Korsør, Denmark.
Arc – a domesticated retroviral Gag protein. 2019, Department of Microbiology, Tumor and Cell Biology, Karolinska Institute, Sweden.
Selection of a super stabilized variant of CI2. 2019, Department of Medical Biochemistry and Microbiology, Uppsala University, Uppsala, Sweden.
Selection of a super stabilized variant of CI2. 2022, Department of Medical Biochemistry and Microbiology, Lund University, Sweden.

Other:
Grant evaluator for the European Research Councik, Research Council Norway and the National Science Center – Poland.
Faculty opponent at PhD defense, University of Uppsala, 2008, 2022
Member of the evaluation committee at PhD defenses at the universities in Lund, Linköping, Copenhagen, Aarhus and Aalborg.
Member of the Editorial Board for Journal of Biological Chemistry.
Guest editor Frontiers in Molecular Biosciences.
Reviewer for Nature Chem., Nature Comm., Chem. Sci., Curr. Opin. Struct. Biol., Chemistry, Sci. Rep., J. R. Soc.

Interface, Langmuir, Biochemistry, J. Biomol. NMR, Protein Eng. Des. Sel., and Proteins.

Data base depositions

Author of 21 protein structures (12 by NMR and 9 by X-ray) and 21 NMR datasets.
PDB: 1PA2,1FHF,1RW5,1ST7,2IZ4,2IZ3,2KBG,2KKJ,2LFG,2LUI,5JWJ,5LK6,
5NCA,6GSE,6Q5Z,6Y5S,6Y5T,7A1H,7A3M,7AOK,7AON.
BMRB:5351,6188,6643,7243,7304,15036,15037,15711,15712,15713,15714,16363,18176,
18177,18522,30087,34112,34285,51192,51194,51195