

Abhishek A. Jalan

(formerly Abhishek Anan)

ORCID: 0000-0003-1498-5077

Department of Biomaterials (TAO Building)

University of Bayreuth Bayreuth DE 95447

Abhishek-anan.jalan@uni-bayreuth.de

Office: +49 (0921) 55 6728

Academic Experience

Group Leader University of Bayreuth (UBT), Germany 05.2022-present

Current projects

- How do collagens fold, how mutation perturbs its folding and stability landscape and how this influences the phenotypic severity of collagen-related diseases?
- How do a class of pro-inflammatory receptor tyrosine kinases called Discoidin Domain Receptors (DDR) achieve selective recognition of different collagen types and how it influences their clustering, associated signalling pathways and crosstalk with other receptors, most notably integrins?

DFG Postdoctoral Fellow University of Bayreuth, Germany 01.2020-04.2022

Advisor – Birte Höcker

Humboldt Postdoctoral Fellow, University of Bayreuth, Bayreuth, DE 08.2017-12.2019

Advisor – Birte Höcker

Newton International Fellow, University of Cambridge, Cambridge, UK 07.2015-07.2017

Advisor – Richard Farndale

Parental leave to start a family 06.2014-06.2015

- Two children born in 2015 and 2019.

PhD (Chemistry), Welch Foundation Predoctoral Fellow Rice University, USA 08.2009-05.2014

Advisor – Jeffrey Hartgerink

Computational and rational design of triple-helical peptides to investigate sequence-structure and structure-function relationships in collagen.

- Developed technology to obtain proof-of-principle heterotrimeric collagen triple-helical peptides.
- Developed a technology to obtain collagen peptides containing epitopes for recognition of collagen-binding proteins.
- Developed technology to obtain DNA-like sticky-ended collagen triple-helical peptides with the potential to supramolecularly organize into higher-order structures.
- Demonstrated that electrostatic interactions can potentially stabilize prokaryotic collagens lacking a key post-translationally modified amino acids required for stability.

MS (Thesis in Chemistry), Syracuse University, Syracuse, NY USA 08.2006-07.2009

Advisor – Tewodros Asefa

Development of organically and inorganically functionalized nanoporous silica and investigations into their catalytic and material applications.

- Developed mesoporous silica materials functionalized with organic functional groups or metal/metal oxide nanocluster to catalyse enantioselective carbon-carbon bond forming Henry Reaction.
- Developed a simple method to obtain selectivity between β -nitroalcohols, nitroalkene and Michael addition products during base catalysed condensation of nitroalkenes with aldehyde or ketones.
- Developed hydrophobicity-controlled nanoporous silica to obtain selectivity over reactants during Henry Reaction.
- Developed dirhodium carboxylate complex functionalized mesoporous silica for catalysing styrene cyclopropanation

- Developed a technology to determine surface electrostatic charge on negative or positively charged gold nanoparticles using “Keplerate” polyoxomolybdate clusters.

MSc (Inorganic Chemistry), University of Delhi, New Delhi, India 07.2003-05.2005
Development of cloud point methodology for sequestration of heavy metal ions from sewage water

BSc (Chemistry with Honours), University of Delhi, New Delhi, India 07.2000-06.2003

Research articles (*times cited = 1111; h-index = 16, i10-index=19, source: Google Scholar as queried on 23.02.2023*)

* *corresponding author*

1. SAH Hulgán, **AA Jalan**, I-Che Li, DR Walker, MD Miller, AJ Kosgei, W Xu, GN Phillips, JD Hartgerink* (2020) Covalent capture of collagen triple helices using lysine – aspartate and lysine – glutamate pairs. **Biomacromolecules** 21: 3772-81
2. **AA Jalan***, D Sammon, JD Hartgerink, P Brear, K Scott, SW Hamai, EJ Hunter, DR Walker, B Leitinger, RW Farndale (2020) Chain alignment of collagen I deciphered using computationally designed heterotrimers. **Nat Chem Biol** 16: 423-29
3. I-Che Li, SAH Hulgán, DR Walker, RW Farndale, JD Hartgerink*, **AA Jalan*** (2019) Covalent Capture of Heterotrimeric Collagen Helix. **Org Lett** 21: 5480-84
4. VA Kumar, NL Taylor, S Shi, BK Wang, **AA Jalan**, MK Kang, NC Wickremasinghe, JD Hartgerink* (2015) Highly Angiogenic Peptide Nanofibers. **ACS Nano** 9: 860-68
5. VA Kumar, S Shi, BK Wang, I-Che Li, **AA Jalan**, B Sarkar, NC Wickremasinghe, JD Hartgerink* (2015) Drug-Triggered and Cross-linked Self-assembling Nanofibrous Hydrogels. **J Am Chem Soc** 137: 4823-30
6. AM Acevado-Jake, **AA Jalan**, JD Hartgerink* (2015) Comparative NMR Analysis of Collagen Triple Helix Organization from N- to C-Termini. **Biomacromolecules** 16: 145-55
7. VA Kumar, NL Taylor, **AA Jalan**, LK Hwang, BK Wang, JD Hartgerink* (2014) A Nanostructured Synthetic Collagen Mimic for Hemostasis. **Biomacromolecules** 15: 1484-90
8. **AA Jalan**, K. Jochim, JD Hartgerink* (2014) Rational Design of a Sticky-ended Collagen Triple Helix with a Non-Canonical Offset. **J Am Chem Soc** 136: 7535-38
9. **AA Jalan**, B Demeler, JD Hartgerink* (2013) Hydroxyproline-free Single Composition ABC Collagen Heterotrimer. **J Am Chem Soc** 135: 6014-17
10. **AA Jalan** & JD Hartgerink* (2013) Simultaneous Control of Composition and Register of an AAB-type Collagen Heterotrimer. **Biomacromolecules** 14: 179-85
11. JA Fallas, MA Lee, **AA Jalan**, JD Hartgerink* (2012) Rational Design of Single-Composition ABC Collagen Heterotrimers. **J Am Chem Soc** 134: 1430-33
12. G Jonathan, **AA Jalan**, S Jones, CR Hine, R Alam, S Garai, M Maye, A Muller, J Zubieta* (2014) Keplerate Cluster (Mo-132) Mediated Electrostatic Assembly of Nanoparticles **J Coll Int Sci** 432: 144-50
13. EV Dikarev, DK Kumar, AS Filatov, **A Anan**, Y Xie, T Asefa, MA Petrukhina* (2010) Recyclable Dirhodium Catalysts Embedded in Nanoporous Surface-functionalized Organosilica Hosts for Carbenoid-mediated Cyclopropanation Reactions. **ChemCatChem** 2: 1461-66

14. Y Xie, KK Sharma, **A Anan**, G Wang, A Biradar, T Asefa* (2009) Efficient Solid-base Catalysts for Aldol Reaction by Optimizing the Density and Type of Organoamine Groups on Nanoporous Silica. **J Catal** 265: 131-40
15. **A Anan**, KK Sharma, T Asefa* (2008) Selective Efficient Nanoporous Catalysts for Nitroaldol Condensation: Co-placement of Multiple Site-isolated Functional Groups on Mesoporous Materials. **J Mol Catal A: Chem** 288: 1-13 (**Editor's Choice Article**)
16. **A Anan**, R Vathyam, T Asefa* (2008) Controlled Synthesis of the Henry Reaction Products: Nitroalcohol Versus Nitrostyrene by a Simple Change of Amino-Groups of Aminofunctionalized Nanoporous Catalysts. **Catal Lett** 126: 142-148
17. KK Sharma, **A Anan**, RP Buckley, W Ouellette, T Asefa* (2008) Towards Efficient Nanoporous Catalysts: Controlling Site-isolation and Concentration of Grafted Catalytic Sites on Nanoporous Materials with Solvents and Colorimetric Elucidation of their Site-isolation. **J Am Chem Soc** 130: 218-228
18. Z Tao, MP Morrow, KK Sharma, C Duncan, **A Anan**, T Asefa, HS Penefsky, J Goodisman*, A Kader* (2008) Mesoporous Silica Nanoparticles Inhibit Cellular Respiration. **Nano Lett** 8: 1517-1526

Review articles

19. **AA Jalan** & JD Hartgerink* (2013) Pairwise Interactions in Collagen and the Design of Heterotrimeric Helices. **Curr Opin Chem Biol** 17: 960-967

Book chapters

20. T Asefa, **A Anan**, CT Duncan, Y Xie (2009) Functionalized Nanoporous and Mesoporous Heterogeneous Catalysts – New Synthetic Strategies and Applications. Invited chapter in **Heterogeneous Catalysis Research Progress** (Nova Publishers) Chapter 2: 81-110
21. T Asefa, **A Anan**, CT Duncan, Y Xie (2009) Spherical and Anisotropic Non-Magnetic Core-Shell Nanomaterials: Synthesis and Characterization. Invited chapter in **Nanomaterials for the Life Sciences** (Wiley-VCH) Volume 3, Chapter 9: 281-330
22. T Asefa, KK Sharma, **A Anan**, R Vathyam, RP Buckley, HM Dam, Y Xie, S Quinlivan, G Wang, CT Duncan (2008) Efficient and Selective Nanoporous Catalysts by Placing Multiple Site-isolated Functional Groups on Mesoporous Materials. Invited chapter in **Nanoporous Materials** (World Scientific Publication Co., Singapore) 497-508.

Posters, presentations and conferences

1. **Invited talk**, “Deciphering the code for collagen folding”, FI Engineering Molecular Systems Colloquium, University of Heidelberg (Germany)
2. **Poster**, “Deciphering the code for collagen folding”, Gordon Research Conference in Chemistry and Biology of Peptides 2022
3. **Invited talk**, “Molecular clamps chaperons collagen folding”, Bayreuther Zentrum für Molekulare Biowissenschaften (BZMB) Seminar (2022), University of Bayreuth, Bayreuth, Germany
4. **Selected talk**, “Molecular clamps chaperone collagen folding”, Alpbach Conference on Coiled-Coils 2022, Alpbach, Austria

5. **Selected talk**, “Evolutionary and Design Perspective on Protein Chimeragenesis” at Volkswagen Foundation Protein Evolution Workshop (2021), University of Bayreuth, Bayreuth, Germany
6. **Selected talk**, “Protein Chimeras: More or Less than the Sum of Parts” at Gordon Research Seminar in Protein Folding (2020) Galveston TX USA
7. **Poster** “Protein Chimeras: More or Less than the Sum of Parts” at Gordon Research Conference in Proteins (2019) Holderness, NH USA
8. **Invited talk**, “Folding and Dynamics of a Designed Chimera”, Bayreuther Zentrum für Molekulare Biowissenschaften (BZMB) Seminar (2019), University of Bayreuth, Bayreuth, Germany
9. **Selected talk**, “Folding and Conformational Dynamics of a Chimeric Protein”, BioMac Seminar (2018), University of Bayreuth, Germany
10. **Selected talk**, “Unequal Marriage of Protein Fragments in a Chimera” at Molecular Biosciences Retreat (2018) Lichtenfels Germany
11. **Invited talk*** “Towards Design of Heterotrimeric Toolkit Library and Implications for Chain Registration in Collagen I” at Gordon Research Conference in Collagen (2017) New London NH USA, *could not attend due to visa delay
12. **Selected** as a fully sponsored participant to the 50th Course ERICE Integrative Structural Biology (2017) Erice, Italy
13. **Selected talk** titled “Hydroxyproline-free Single Composition ABC-type Collagen Heterotrimer” at ACS National Meeting (2013), New Orleans LA USA
14. **Selected talk** titled “Tackling Diverse Problems in the Design of Collagen Mimetic Peptides with Salt-bridge Interaction” at Gordon Research Seminar in Collagen (2013), New London NH USA. Talk also selected for presentation at the Gordon Research Conference in Collagen
15. **Poster titled** “Rational Design of a Non-canonical "Sticky-ended" ABC-Collagen Triple Helix” at Gordon Research Conference in Chemistry & Biology of Peptides (2014), Ventura CA USA

Speakers hosted at the University of Bayreuth

1. **Dr. Birgit Letinger**, Reader in Matrix Receptor Signalling, Faculty of Medicine, National Heart & Lung Institute, Imperial College London. “Collagen sensing: How discoidin domain receptors transmit a signal across the membrane and control kinase activity” 18.02.2022
2. **Dr. Franziska Thomas**, Junior Group Leader, Organisch-Chemisches Institut, University of Heidelberg “Engineering the function of β -sheet miniproteins” 15.11.2022
3. **Dr. Wing Ying Chow**, Assistant Professor, Department of Physics, University of Warwick, UK

Fellowship, award and recognitions

- | | |
|-----------|---|
| 2018-2028 | Newton Alumni Fellowship , Royal Society, UK
(For developing and sustaining collaborations in the United Kingdom) |
| 2017-2019 | Humboldt Postdoctoral Fellowship , Humboldt Stiftung, Germany
(Höcker Protein Design Group, University of Bayreuth) |
| 2015-2017 | Newton International Fellowship , The Royal Society & The British Academy, UK |

	(Farndale Matrix Biology Group, University of Cambridge)
2014	Harry B. Weiser Research Award , Rice University (In recognition of outstanding doctoral thesis research)
2010-2014	Robert A. Welch Foundation Predoctoral Fellowship , Rice University (Financial support for doctoral research)
2011	Harry B. Weiser Teaching Award , Rice University (In recognition of outstanding performance as a teaching assistant of Organic Chemistry)
2011	Stephen C. Hoffman Early Achievement Fellowship , Rice University (In recognition of outstanding achievement in the first two years of doctoral research)
2009	William D. Johnson Teaching Award , Syracuse University (In recognition of outstanding performance as a teaching assistant of General Chemistry)

Mentored graduate students

2017-2018	Julian Hubner (MS): currently pursuing PhD at the University of Regensburg
2018-2019	Farid Lukas Hassine (MS)
2019-present	Farid Lukas Hassine (PhD), University of Bayreuth

Teaching experience

At University of Bayreuth

- | | |
|---|----------------------|
| 1. General Inorganic Chemistry
(~20 undergraduate students, 3 hours) | Summer Semester 2020 |
| 2. Biomaterial Practicals for Engineers
(~30 MS course, 2 hours) | Summer Semester 2022 |
| 3. Innovation Management
(~20 MS course, 2 hours) | Summer Semester 2022 |
| 4. Biomaterial Practicals for Biochemists
(MS course, 2 hours) | Summer Semester 2022 |
| 5. Biomaterial Seminar Course | Winter Semester 2023 |
| 6. Self-assembling Biopolymer Seminar | Winter Semester 2023 |

At Rice University,

- | | |
|---|----------------|
| 7. Chemistry 215: Organic Chemistry Laboratory
(40 students, 2 credit hours, Teaching assistant) | Spring 2010-11 |
| 8. Chemistry 123: General Chemistry Laboratory
(40 students, 2 credit hours, Teaching assistant) | Fall 2009 |

At Syracuse University

- | | |
|---|--------------|
| 9. Chemistry 276: Organic Chemistry Laboratory
(40 students, 2 credit hours, Teaching assistant) | Fall 2007-08 |
| 10. Chemistry 117: General Chemistry Laboratory | Spring 2007 |