

CURRICULUM VITAE

Shobhna Kapoor, PhD



PERSONAL DETAILS

Date and Place of Birth	24.04.1985 New Delhi, India
Nationality	Indian
Current Address	Department of Chemistry, Indian Institute of Technology Bombay, Powai Mumbai-400076, Maharashtra, India
Previous Address	Department of Chemical Biology, Max Planck Institute of Molecular Physiology, Otto-Hahn-Str. 11, Dortmund, Germany
Email	shobhnakapoor@chem.iitb.ac.in , shobhna.kapoor@mpi-dortmund.mpg.de , kapoor_shobhna@yahoo.co.in

EDUCATION

2009 – 2012	Doctor of Natural Sciences (PhD), Biophysics <i>Technische Universität Dortmund, Germany</i> Grade: <i>Summa Cum Lauda (1.0) / Ausgezeichnet</i>
2006 – 2009	Master of Science (M.Sc) <i>Chemistry, Indian Institute of Science, Bangalore, India</i> GPA: 7.1/8, Rank: 1
2003 – 2006	Bachelor of Science (B.Sc) <i>Chemistry, St. Stephens College, Delhi University, Delhi, India.</i> First Class Honours with Distinction, 77.7 %

HONORS AND AWARDS

2016	IIT Bombay Young Faculty Award, India
2013– 2015	Max Planck Post Doctoral Research Fellowship, Dortmund
2013	Dissertation Prize , Faculty of Chemistry and Chemical Biology, Technische Universität Dortmund, Germany.
2009	PCCP Hot Topic Prize for the poster presented at the 110 th Bunsentagung: Annual German Conference on Physical Chemistry, Berlin, Germany.
2009 – 2013	International Max Planck Research Fellowship, Dortmund
2009	NRW Young Scientist Award in Chemistry, 2009, Düsseldorf, Germany. (http://www.young-scientist-award.de/) for the Master Thesis Work.

2009	Dr. A. Nagaraja Rao Medal for the “ <i>Best Master’s Student</i> ” in Chemical Sciences Division presented by the Council of Indian Institute of Science, India.
2005 – 2006	Virendra Kumar Memorial Prize for showing “ <i>greatest proficiency in laboratory work</i> ” during the Academic year 2005-2006 by the Chemistry Department, St. Stephen’s College, Delhi, India.
2004	Meritorious Student Award- Book Grant for the year 2004 by the Faculty of Science, University of Delhi, India.

RESEARCH EXPERIENCE AND INTERNSHIPS

SEP 2013 – NOV 2016	Post Doctoral Research at <i>Department of Chemical Biology, Max Planck Institute for Molecular Physiology, Dortmund, Germany</i> Topic: <i>Small Molecule Mediated Modulation of Cellular Signaling Pathways</i> Supervisor: Prof. Dr. Herbert Waldmann
FEB 2013 – AUG 2013	Post Doctoral Research at <i>Technische Universität Dortmund, Germany</i> Topic: <i>Astro-Biophysical Chemistry, Behavior of Biomolecules under extreme environmental conditions.</i> Supervisor: Prof. Dr. Roland Winter
2009 – JAN 2013	Doctoral Research at <i>Technische Universität Dortmund, Germany and IMPRS-CMB</i> Thesis Title: <i>Biophysical Insights into the Ras-Membrane Ballet: Orientational Flexibility, Conformational Substates and Mechanosensitivity of Ras Proteins.</i> Supervisor: Prof. Dr. Roland Winter
2006 – 2009	Master’s Thesis at <i>Solid State and Structural Chemistry Unit, Indian Institute of Science (IISc), Bangalore, India</i> Title: <i>Nanostructured Inorganic materials for Biotechnological Applications.</i> Supervisor: Prof. Dr. Aninda J. Bhattacharyya
DEC 2007 – JAN 2008	Research Internship at <i>School of Studies in Neurosciences & Bio-Informatics Center, Jiwaji University, India</i> Title: <i>Molecular Histopathology of HIV-Tuberculosis meningitis using techniques in immunochemistry and molecular histopathology.</i> Supervisor: Prof. Ishan Patro
JUNE 2007 – AUGUST 2007	Research Internship at <i>LIONEX, Diagnostics and Therapeutics GmbH, Germany</i> Title: <i>A biochemical Route to Rational Drug Design</i> Supervisors: Dr. Ralf Spalleck, Dr. Wulf Oehlmann and Prof. Mahavir Singh
JUNE 2005 – AUG 2005	Summer Undergraduate Research Program at <i>Dr. B. R. Ambedkar Center for Biomedical Research, University of Delhi, India</i> Title: <i>Purification of mouse α-2 macroglobulin and preparation of mouse albumin–malondialdehyde acetaldehyde (MAA) proteins adducts to study the role of adducts in pathogenesis of alcoholic liver disease.</i> Supervisor: Dr. Anju Katyal

DEC 2003 – JAN 2004

Research Internship at *Department of Chemistry, University of Delhi, India*

Title: *The study of Heme Oxygenase activity and its role in the progression of oxidative stress in carbon tetrachloride induced mice model.*

Supervisor: Prof. Ritu Aneja (Currently at Georgia State University, USA)

PEER REVIEWED PUBLICATIONS

1. **Kapoor, S.**, Ziegler, S., Waldmann, H. (2016). Novel Approaches to Map Small Molecule-Target Interactions. *Bioorganic and Medicinal Chemistry*, 24, 3232-3245.
2. **Kapoor, S.**, Narayan, R., Vendrell, G., Schneidewind, T., Ziegler, S., Antonchick, A., and Waldmann, H. (2016). *Tropanes Induce Cytokinetic Defects in Cells by Potently Inhibiting Myosin Light Chain Kinase*. Under Revision. *Cell Chemical Biology*.
3. **Kapoor, S.**, Rao, S., Ziegler, S., and Waldmann, H. (2016). *Novel Downstream Inhibitors of Wnt Signalling in Human Colon Carcinoma*. Manuscript Under Preparation.
4. **Kapoor, S.**, Sheremet, M., Kumar, K., Ziegler, S., and Waldmann, H. (2016). *Withanolides: Potent Inhibitors of Wnt Pathway*. Manuscript Under Preparation.
5. Sperlich, B., **Kapoor, S.**, Waldmann, H., Winter, H., and Weise, K. (2016). Regulation of K-Ras4B membrane binding by calmodulin. *Biophysical Journal*, 111, 113-122.
6. **Kapoor, S.**, and Winter, R. (2016). Pressure Perturbation: A Prime Tool to Study Conformational Substates and Volume Fluctuations of Biomolecular Assemblies. *In: Molecular Science of Fluctuations towards Biological Functions*. Springer. pp 29-64.
7. Luong, T.O., **Kapoor, S.**, and Winter, R. (2015). Pressure—A Gateway to Fundamental Insights into Protein Solvation, Dynamics and Function. *ChemPhysChem*, 16, 3555-3571. *Cover Picture*
8. **Kapoor, S.**, Fansa, E.K., Möbitz, S., Ismail, S.A., Winter, R., Wittinghofer, A., and Weise, K. (2015). Effect of the N-terminal Helix and Nucleotide Loading on the Membrane and Effector binding of Arl2/3. *Biophysical Journal*, 109, 1619-1629.
9. **Kapoor, S.**, Berghaus, M., Suladze, S., Prumbaum, D., Grobelny, S., Degen, P., Raunser, S., and Winter, R. (2014). Prebiotic Cell Membranes Survive Extreme Environmental Pressure Conditions. *Angew. Chem. Int. Ed.* 53, 8397-8401.
10. Georget, E., **Kapoor, S.**, Winter, R., Reineke, K., Song, Y., Callanan, M., Ananta, E., Heinz, V., and Mathys, A. (2014). In Situ Investigation of *Geobacillus Stearothermophilus* Spore Germination and Inactivation Mechanisms under Moderate High Pressure. *Food Microbiol.* 41, 8-18.
11. **Kapoor, S.**, Werkmueller, A., Goody, R.S., Waldmann, H., and Winter, R. (2013). Pressure modulation of Ras-Membrane interactions and intervesicle transfer. *J. Am. Chem. Soc.* 135, 6149-6156.
12. Prigozhin, M.B., Liu, Y., Wirth, A.J., **Kapoor, S.**, Winter, R., Schulten, K., and Gruebele, M. (2013). Misplaced Helix Slows Down Ultrafast Pressure-Jump Protein Folding. *Proc. Natl. Acad. Sci. U.S.A.*, 110, 8087-8092.
13. Weise, K., Huster, D., **Kapoor, S.**, Triola, G., Waldmann, H., and Winter, R. (2013). Gibbs energy determinants of lipoprotein insertion into lipid membranes: The case study of Ras proteins. *Faraday Discussions* 161, 549-561.
14. **Kapoor, S.**, Weise, K., ErIkamp, M., Triola, G., Waldmann, H., and Winter, R. (2012). The role of G-domain orientation and nucleotide state on the Ras isoform-specific membrane interaction. *Eur. Biophys. J.* 41, 801-813.
15. **Kapoor, S.**, Triola, G., Vetter, I.R., ErIkamp, M., Waldmann, H., and Winter, R. (2012). Revealing conformational substates of lipidated N-Ras protein by pressure modulation. *Proc. Natl. Acad. Sci. U.S.A.* 109, 460-465.
16. Weise, K., **Kapoor, S.**, Wekmüller, A., Möbitz, S., Zimmermann, G., Triola, G., Waldmann, H., and Winter, R. (2012). Dissociation of the K-Ras4B/PDE δ complex upon contact with lipid membranes: Membrane delivery instead of extraction. *J. Am. Chem. Soc.* 134, 11503-11510.
17. Seeliger, J., Evers, F., Jeworrek, C., **Kapoor, S.**, Weise, K., Andreetto, E., Tolan, M., Kapurniotu, A., and Winter, R. (2012). Cross-amyloid interaction of A β and IAPP at lipid membranes. *Angew. Chem. Int. Ed.* 51, 679-683.

18. Barackov, I., Mause, A., **Kapoor, S.**, Winter, R., Schembecker, G., and Burghoff, B. (2012). Investigation of structural changes of β -casein and lysozyme at the gas-liquid interface during foam fractionation. *J. Biotech.* 161, 138-146.
19. Henke, S., Schneemann, A., **Kapoor, S.**, Winter, R., and Fischer, RA. (2012). Zinc-1,4-benzenedicarboxylate-bipyridine frameworks - Linker functionalization impacts network topology during solvothermal synthesis. *J. Mat. Chem.* 22, 909-918.
20. Weise, K., **Kapoor, S.**, Denter, C., Nikolaus, J., Opitz, N., Koch, S., Triola, G., Herrmann, A., Waldmann, H., and Winter, R. (2011). Membrane-Mediated Induction and Sorting of K-Ras Microdomain Signaling Platforms. *J. Am. Chem. Soc.* 133, 880-887. *Appeared as a cover article*
21. **Kapoor, S.**, Werkmuller, A., Denter, C., Zhai, Y., Markgraf, J., Weise, K., Opitz, N., and Winter, R. (2011). Temperature-pressure phase diagram of a heterogeneous anionic model biomembrane system: Results from a combined calorimetry, spectroscopy and microscopy study. *Biochim. Biophys. Acta, Biomembr.* 1808, 1187-1195.
22. **Kapoor, S.**, Girish, TS., Mandal, SS., Gopal, B., and Bhattacharyya, AJ. (2010). Inhibition of a protein tyrosine phosphatase using mesoporous oxides. *J. Phys. Chem. B.* 114, 3117-3121.
Selected highlight: Nature India, March 2010
23. **Kapoor, S.**, Hegde, R., and Bhattacharyya, AJ. (2009). Influence of Surface Chemistry of Mesoporous Alumina with Wide Pore Size Distribution on Controlled Release. *J. Controlled Release.* 140, 34-39.
24. **Kapoor, S.**, Mondal, SS., and Bhattacharyya, AJ. (2009). Structure and Function of Hemoglobin Confined Inside Silica Nanotubes. *J. Phys. Chem. B.* 113, 14189-14195. *Appeared as a cover article*
25. **Kapoor, S.**, and Bhattacharyya, AJ. (2009). Ultrasound-Triggered Controlled Drug Delivery and Biosensing Using Silica Nanotubes. *J. Phys. Chem. C.* 113, 7155-7163.
Selected highlight and press: Bangalore Mirror, October 14, 2009.
26. Das, SK., **Kapoor, S.**, Yamada, H., and Bhattacharyya, AJ. (2009). Effects of Surface acidity and pore size of Mesoporous alumina on degree of loading and controlled release of Ibuprofen. *Microporous and Mesoporous Materials* 118, 267-272.
27. Argen, D., Stehr, M., Berthold, CL., **Kapoor, S.**, Oehlmann, W., Singh, M., and Schneider, G. (2008). Three-dimensional Structure of Apo and Holo-I-Alanine Dehydrogenase from Myobacterium Tuberculosis Reveal Conformational Changes upon Coenzyme Binding. *J. Mol. Biol.* 377, 1161-1173.

EXPERTISE IN VARIOUS TECHNIQUES/METHODOLOGIES

BIOPHYSICAL CHEMISTRY/MOLECULAR BIOPHYSICS

1. Atomic Force Microscopy (AFM) and Confocal Microscopy
2. Fluorescence and UV Spectroscopy (also under high pressure conditions)
3. Infrared Spectroscopy (Transmission, Polarized Attenuated Total Reflection (ATR) Infrared Spectroscopy, and Infrared Reflection Absorption Spectroscopy (IRRAS)). (Also under high pressure conditions)
4. Stopped-Flow Techniques (Fluorescence/Infrared-based)
5. Circular Dichroism (CD) Spectroscopy
6. X-Ray Diffraction and Thermo-gravimetric Analysis
7. Cyclic Voltammetry
8. Electron Microscopy (TEM, SEM)
9. Synthesis of nanomaterials (nanotubes and mesoporous materials)

CELL BIOLOGY/CHEMICAL BIOLOGY/MOLECULAR BIOLOGY AND BIOCHEMISTRY

10. Cell culture, cell-based phenotypic screening and assays, Live cell imaging and reporter gene assays
11. In-Cell-Western (ICW) technique, Biological assay development
12. Immunofluorescence Confocal Microscopy
13. In-vitro Enzymatic Assays
14. Flow Cytometry (Fluorescence-Activated cell sorting (FACS))

15. Target Identification methods, Affinity based pulldown, Stable isotope labelling of amino acids in cell culture (**SILAC**), Proteomics.
16. Cellular Target engagement methods: Proximity Ligation Assay (**PLA**), Cellular thermal shift assay (**CETSA**)
17. Transfection and siRNA knock down methods, and **Molecular Cloning**
18. Protein Expression and Purification; Polyacrylamide and Agarose Gel Electrophoresis
19. DNA/Plasmid and RNA Isolation
20. (Quantitative) Polymerase Chain Reaction (**qPCR**) and Primer Designing

TEACHING EXPERIENCE

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| 2009 – 2013 | Basic Physical Chemistry course at Technische Universität Dortmund, Germany. |
| 2009 – 2013 | Advanced Biophysical Chemistry course at Technische Universität Dortmund, Germany |

SCIENTIFIC SOCIETY MEMBERSHIPS and REVIEWER ACTIVITY

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| 2009 – CURRENT | German Biophysical Society, Germany |
| 2009 – CURRENT | Deutsche Bunsen-Gesellschaft für physikalische Chemie e. V. (DBG) |
| 2009 – 2013 | BPS , Biophysical Society, USA |
| 2015 – present | Reviewer for the Journal of Bioorganic and Medicinal Chemistry Letters |

SCIENTIFIC CONFERENCES

1. 21st International Conference on Organic Synthesis (ICOS 21), IIT Bombay, Mumbai, India. December 2016.
2. RIKEN-MAX PLANCK Fifth Annual Symposium in Systems Chemical Biology, Berlin, Germany. April 2016. **Talk**
3. MPI-RIKEN Second Symposium in Chemical Biology, Kobe Port, Japan. May 2015. **Poster**
4. 10th Status Seminar in Chemical Biology, DECHEMA Haus, Frankfurt. January 2015. **Poster**
5. 4th IMPRS Student Symposium: Chemical Biology-Exploring the Interface, Max Planck Institute of Molecular Physiology, Dortmund. November 2012. **Talk**
6. 7th International Conference on High Pressure Biosciences and Biotechnology, Otsu, Japan. October 2012. **Talk**
7. Cold Spring Harbor Asia Conference on Small GTPases, Suzhou, China. September 2012. **Poster**
8. Bunsentagung: Annual German Conference on Physical Chemistry, Leipzig, Germany. May 2012. **Poster**
9. MPI-RIKEN Kick *Off* Symposium, Dortmund, Germany. March 2012. **Talk**
10. Annual Biophysical Society Conference, California, USA. February 2012. **Poster**
11. Tag Der Chemie, Technische Universität Dortmund, Germany. February 2012. **Talk**
12. Bunsentagung Annual German Conference on Physical Chemistry, Berlin, Germany. June 2011. **Poster (Poster Prize)**
13. University of Utrecht and International Max Planck Research School Joint Symposium on Chemical Biology, Utrecht, Netherlands. May 2011. **Talk**

14. Tag Der Chemie, Technische Universität Dortmund, Germany. February 2011. **Poster**
15. International Max Planck Research School Symposium: Chemical Biology-Exploring the interface, Max Planck Institute of Molecular Physiology, Dortmund, Germany. September 2011. **Poster**
16. Collaborative Research Center (SFB) 642 "GTP- and ATP-Dependent Membrane Processes-Summer School, Wenden, Germany. September 2011. **Talk**
17. Annual Meeting of German Biophysical Society, Ruhr-Universität, Bochum, Germany. October 2010. **Poster**
18. *3rd IMPRS Student Symposium: Chemical Biology-Exploring the interface, 26th-28th September 2010*, Max Planck Institute of Molecular Physiology, Dortmund. **Talk**
19. XII- Linz Winter Workshop, February 2010, Johannes Kepler Universität Linz, Linz, Austria.
20. International Symposium on Trends in Drug Discovery and Development, January 2010, Department of Chemistry, University of Delhi. India. **Poster**
21. 10th CRSI National Symposium (Chemical Research Society of India), 2008, Indian Institute of Science, Bangalore, India. **Poster**