



August 1990 – March 1996      Doctoral research with Prof. M. Vijayan,  
Molecular Biophysics Unit, Indian Institute of  
Science, Bangalore.

### **Honours and awards:**

- 2018 **GD Birla Award** for Scientific Research for the year 2017
- 2018 **Sun Pharma Research Award** for 2016 in Medical Sciences under Basic Sciences Category
- 2017 **Dr. M. R. Das Memorial lecture** awarded by INSA, New Delhi.
- 2015 Awarded the **G. N. Ramachandran Gold Medal** for Excellence in Biological Sciences and Technology by CSIR, India.
- 2015 Awarded the **JC Bose National Fellowship** from Science and Engineering Research Board (SERB), India.
- 2014 Delivered the 3rd **G. N. Ramachandran Award Lecture** at the IUPAB-International Biophysics Congress (IBC)-2014 in Brisbane, Australia.
- 2014 Editorial board member of **Frontiers in Molecular Biosciences**, a Swiss, Gold open-access academic publisher in partnership with Nature Publishing Group.
- 2014 Editorial board member of **Current Opinion in Structural Biology**, an Elsevier publication.
- 2013 Appointed as the **Associate Editor** of the **Journal of Structural Biology**, an Elsevier publication.
- 2013 **Editorial Advisory Panel member for Biochemical Journal**, Portland Press Limited.
- 2013 Elected as a **Fellow of Indian National Science Academy**, New Delhi, India.
- 2012 Elected as a **Fellow of Andhra Pradesh Academy of Sciences**, Hyderabad, India.
- 2011 Awarded the **Shanti Swarup Bhatnagar Prize** in Biological Sciences.
- 2010 Elected as a **Fellow of National Academy of Sciences**, Allahabad, India.
- 2010 Elected as a **Fellow of Indian Academy of Sciences**, Bangalore, India.

- 2009 Appointed as the **Co-Editor of *Acta Crystallographica***, an International Union of Crystallography publication.
- 2009 Awarded the **BM Birla Science Prize** for 2008 in Biological Sciences.
- 2009 Received the **National Bioscience Award** for the year 2008 from the Department of Biotechnology, India.
- 2008 Received the **Endeavour Executive Award** from the Department of Education, Science and Training (DEST), Australia.
- 2007 Editorial board member of the **Journal of Structural Biology**, an Elsevier publication.
- 2007 Awarded the **Swarnajayanti Fellowship** for the year 2005-06 from the Department of Science and Technology, India.
- 2004 Elected as a member of **Guha Research Conference**.
- 2003 Received an **International Senior Research Fellowship (ISRF)** award in Biomedical Science for five years from The Wellcome Trust, UK.
- 1996 '**Shamrao Kaikini Gold medal and award**' for the best thesis from Indian Institute of Science, Bangalore.
- 1990 '**Gold medal**' from Madura College, Madurai for M.Sc. in Physics branch.

## Publications

\*Corresponding author(s). If not indicated, the last author is the corresponding author.

### Research Articles

1. Kuncha, S. K., Suma, K., Pawar, K. I., Gogoi, J., Routh, S. B., Pottabathini, S., Kruparani, S. P. and Sankaranarayanan, R. (2018) A discriminator-based DTD surveillance ensures faithful glycine delivery for protein biosynthesis in bacteria. biorXiv, doi: <https://doi.org/10.1101/322289>.
2. Kuncha, S. K., Mazed, M., Singh, R., Kattula, B., Routh, S. B. and Sankaranarayanan, R. (2018) A chiral selectivity paralog of DTD for proofreading tRNA mischarging in Animalia. *Nature Commun.* **9**:511, 1-13.
3. Tayi, L., Kumar, S., Nathawat, R., Haque, A. S., Maku, R. V., Patel, H. K., Sankaranarayanan, R.\* and Sonti, R. V.\* (2017) A mutation in an exoglucanase of *Xanthomonas oryzae* pv. *oryzae* that confers an endo mode of activity affects bacterial virulence but not the induction of immune responses in rice. *Mol. Plant. Pathol.* **19**, 1364-1376.
4. Pawar, K. I., Suma, K., Seenivasan, A., Kuncha, S. K., Routh, S. B., Kruparani, S. P. and Sankaranarayanan, R. (2017) Role of D-aminoacyl-tRNA deacylase beyond chiral proofreading as a cellular defense against glycine mischarging by AlaRS. *Elife* **6**, e24001, 1-19 (Covered by *Spotlight article in TIBS* vol 42:9, September, 2017).
5. Srivastava, S. S., Jamkhindikar, A. A., Raman, R., Jobby, M. K., Chandawada, S., Sankaranarayanan, R.\* and Sharma, Y.\* (2017) A Transition Metal-Binding, Trimeric  $\beta\gamma$ -Crystallin from Methane-Producing Thermophilic Archaea, *Methanosaeta thermophila*. *Biochemistry* **56**, 1299-1310.
6. Routh, S. B., Pawar, K. I., Ahmad, S., Singh, S., Suma, K., Kumar, M., Kuncha, S. K., Yadav, K., Kruparani, S. P. and Sankaranarayanan, R. (2016) Elongation factor Tu prevents misediting of Gly-tRNA(Gly) caused by the design behind the chiral proofreading site of D-aminoacyl-tRNA deacylase. *PLOS Biol.* **14**(5) e1002465, 1-22.
7. Priyadarshan, K., Patel, K. D., Haque, A. S., Singh, R., Gokhale, R. S. and Sankaranarayanan, R. (2016) Structural insights into the regulation of NADPH binding to reductase domains of nonribosomal peptide synthetases: A concerted loop movement model. *J. Struct. Biol.* **194**, 368-374.
8. Srivastava, S., Chaudhary, S., Thukral, L., Shi, C., Gupta, R. D., Gupta, R., Priyadarshan, K., Vats, A., Haque, A. S., Sankaranarayanan, R., Natarajan, V. T., Sharma, R., Aldrich, C. C. and Gokhale, R. S. (2015) Unsaturated Lipid Assimilation by Mycobacteria Requires Auxiliary cis-trans Enoyl CoA Isomerase. *Chemistry & Biology* **22**, 1577-1587.
9. Ahmad, S., Muthukumar, S., Kuncha, S. K., Routh, S. B., Yerabham, A. S. K., Hussain, T., Kamarthapu, V., Kruparani, S. P. and Sankaranarayanan, R. (2015) Specificity and catalysis hardwired at the RNA-protein interface in a translational proofreading enzyme. *Nature Commun.* **6**:7552.
10. Gupta, M. K., Nathawat, R., Sinha, D., Haque, A. S., Sankaranarayanan, R. and Sonti, R. V. (2015) Mutations in the predicted active site of *Xanthomonas oryzae* pv. *oryzae* XopQ differentially affect virulence, suppression of host innate immunity and

- induction of HR in a non-host plant. *Mol. Plant Microbe Interact.* **28**, 195-206.
11. Haque, A. S., Patel, K. D., Deshmukh, M. V., Chhabra, A., Gokhale, R. S. and Sankaranarayanan, R. (2014) Delineating the reaction mechanism of reductase domains of Nonribosomal Peptide Synthetases from mycobacteria. *J. Struct. Biol.* **187**, 207-214.
  12. Ahmad, S., Routh, S. B., Kamarthapu, V., Chalissery, J., Muthukumar, S., Hussain, T., Kruparani, S. P., Deshmukh, M. V. and Sankaranarayanan, R. (2013) Mechanism of chiral proofreading during translation of the genetic code. *Elife* **2**, e01519, 1-18. (#Highlighted as Science Editor's Choice article: 'Chirality Check' *Science* **Vol. 343**, p119; 10<sup>th</sup> January, 2014)
  13. Ahmad, S., Sravankumar, A. S., Kruparani, S. P. and Sankaranarayanan, R. (2012) Cloning, expression, purification, crystallization and preliminary X-ray crystallographic analyses of threonyl-tRNA synthetase editing domain from *Aeropyrum pernix*. *Acta Cryst.* **F68**, 1390-1393.
  14. Rajanikanth, V., Srivastava, S. S., Singh, A. K., Rajyalakshmi, M., Chandra, K., Aravind, P., Sankaranarayanan, R.\* and Sharma, Y.\* (2012) Aggregation prone near-native intermediate formation during unfolding of a structurally similar nonlenticular  $\beta\gamma$ -crystallin domain. *Biochemistry* **51**, 8502-8513.
  15. Kumar, S., Haque, A. S., Jha, G., Sonti, R. V. and Sankaranarayanan, R. (2012) Crystallization and preliminary crystallographic studies of CbsA, a secretory exoglucanase from *Xanthomonas oryzae pv. oryzae*. *Acta Cryst.* **F68**, 1191-1194.
  16. Chhabra, A., Haque, A. S., Pal, R. K., Goyal, A., Rai, R., Joshi, S., Panjekar, S., Pasha, S., Sankaranarayanan, R.\* and Gokhale, R. S.\* (2012) Nonprocessive [2+2]<sup>e</sup> off-loading reductase domains from mycobacterial nonribosomal peptide synthetases. *Proc. Natl. Acad. Sci. (USA)* **109**, 5681-5686.
  17. Goyal, A., Verma, P. Anandhakrishnan, M., Gokhale, R. S.\* and Sankaranarayanan R.\* (2012) Molecular basis of the functional divergence of fatty acyl-AMP ligase biosynthetic enzymes of *Mycobacterium tuberculosis*. *J. Mol. Biol.* **416**, 221-238.
  18. Mishra, A., Suman, A. K., Srivastava, S. S., Sankaranarayanan, R.\* and Sharma, Y.\* (2012) Decoding the molecular design principles underlying Ca(2+) binding to  $\beta\gamma$ -crystallin motifs. *J. Mol. Biol.* **415**, 75-91.
  19. Puri, V., Goyal, A., Sankaranarayanan, R., Enright, A. J. and Vaidya, T. (2011) Evolutionary and functional insights into Leishmania META1: evidence for lateral gene transfer and a role for META1 in secretion. *BMC Evol. Biol.* **11**, 334.
  20. Kamal, M. Z., Ahmad, S., Molugu, T. R., Vijayalakshmi, A., Deshmukh, M. V., Sankaranarayanan, R. and Rao, N. M. (2011) In vitro evolved and non-aggregating and thermostable lipase: Structural and thermodynamic investigation. *J. Mol. Biol.* **413**, 726-741.
  21. Chennupati, V., Datta, D., Rao, M. R., Boddapati, N., Kayasani, M., Sankaranarayanan, R., Mishra, M., Seth P, Mani, C. and Mahalingam, S. (2011) Signals and Pathways Regulating Nucleolar Retention of Novel Putative Nucleolar GTPase NGP-1(GNL-2). *Biochemistry* **50**, 4521-4536.
  22. Hussain, T., Kamarthapu, V., Kruparani, S. P., Deshmukh, M. V. and Sankaranarayanan, R. (2010) Mechanistic insights into cognate substrate discrimination during proofreading in translation. *Proc. Natl. Acad. Sci. (USA)* **107**, 22117-22121. (#Covered by an accompanying Commentary article in the same

- PNAS issue titled 'Proofreading in translation: Dynamics of the double-sieve model' p21949-50)
23. Matharu, N. K., Hussain, T., Sankaranarayanan, R. and Mishra, R. K. (2010) Vertebrate homologue of Drosophila GAGA factor. *J. Mol. Biol.* **400**, 434-447.
  24. Dubey, V. P., Pal, B., Srikantan, S., Pottabathini, S., De, P. K. and Sankaranarayanan, R. (2010) Cloning, overexpression, purification, crystallization and preliminary X-ray analysis of a female-specific lipocalin (FLP) expressed in the lacrimal glands of Syrian hamsters. *Acta Cryst* **F66**, 509-512.
  25. Aravind, P., Mishra, A., Suman, S. K., Jobby, M. K., Sankaranarayanan, R.\* and Sharma, Y.\* (2009) betagamma-Crystallin superfamily contains a universal motif for binding calcium. *Biochemistry* **48**, 12180-12190.
  26. Aparna, G., Chatterjee, A., Sonti, R. V. and Sankaranarayanan, R. (2009) A cell wall degrading esterase of *Xanthomonas oryzae* requires a unique substrate recognition module for pathogenesis on rice. *Plant Cell* **21**, 1860-1873.
  27. Roy, S., Aravind, P., Madhurantakam, C., Ghosh, A. K., Sankaranarayanan, R.\* and Das, A. K.\* (2009) Crystal structure of a fungal protease inhibitor from *Antheraea mylitta*. *J. Struct. Biol.* **166**, 79-87.
  28. Arora, P., Goyal, A., Natarajan, V. T., Rajakumara, E., Verma, P., Gupta, R., Yousuf, M., Trivedi, O. A., Mohanty, D., Tyagi, A., Sankaranarayanan, R.\* and Gokhale, R. S.\* (2009) Mechanistic and functional insights into fatty acid activation in *Mycobacterium tuberculosis*. *Nature Chem. Biol.* **5**, 166-173.
  29. Aravind, P., Suman, S. K., Mishra, A., Sharma, Y.\* and Sankaranarayanan, R.\* (2009) Three-Dimensional domain swapping in Nitrollin, a single-domain  $\beta\gamma$ -Crystallin from *Nitrosospora multififormis*, controls protein conformation and stability but not dimerization. *J. Mol. Biol.* **385**, 163-177.
  30. Aravind, P., Mishra, A., Suman, S. K., Sharma, Y.\* and Sankaranarayanan, R.\* (2008) Betagamma-crystallins: A universal calcium-binding superfamily. *Protein Science*, 17, suppl 1, pg.173.
  31. Ahmad, S., Kamal, M. Z., Sankaranarayanan, R.\* and Rao, N. M.\* (2008) Thermostable *Bacillus subtilis* lipases: in vitro evolution and structural insight. *J. Mol. Biol.* **381**, 324-340.
  32. Aravind, P., Wistow, G., Sharma, Y.\* and Sankaranarayanan, R.\* (2008) Exploring the limits of sequence and structure in a variant betagamma-crystallin domain of the protein absent in melanoma-1 (AIM1). *J. Mol. Biol.* **381**, 509-518.
  33. Goyal, A., Saxena, P., Rahman, A., Singh, P., Kasbekar, D., Gokhale, R. S.\* and Sankaranarayanan, R.\* (2008) Structural insights into biosynthesis of resorcinolic lipids by a type III polyketide synthase in *Neurospora crassa*. *J. Struct. Biol.* **162**, 411-421.
  34. Satapathy, A. K., Pavankumar, T. L., Bhattacharjya, S., Sankaranarayanan, R. and Ray, M. K. (2008) ATPase activity of RecD is essential for growth of the Antarctic *Pseudomonas syringae* Lz4W at low temperature *FEBS J.* **27**, 1835-1851.
  35. Rajakumara, E., Acharya, P., Ahmad, S., Sankaranarayanan, R.\* and Rao, N. M.\* (2008) Structural basis for the remarkable stability of *Bacillus subtilis* lipase at low pH. *Biochim. Biophys. Acta* **1784**, 302-311.
  36. Aparna, G., Chatterjee, A., Jha, G., Sonti, R. V. and Sankaranarayanan, R. (2007) Crystallization and preliminary crystallographic studies of LipA, a secretory

- lipase/esterase from *Xanthomonas oryzae* pv. *oryzae*. *Acta Cryst.* **F63**, 708-710.
37. Rao, M. R., Kumari, G., Balasundaram, D., Sankaranarayanan, R. and Mahalingam, S. (2006) A Novel Lysine-rich Domain and GTP Binding Motifs Regulate the Nucleolar Retention of Human Guanine Nucleotide Binding Protein, GNL3L. *J. Mol. Biol.* **364**, 637-654.
38. Hussain, T., Kruparani, S. P., Pal, B., Dock-Bregeon, A-C., Dwivedi, S., Shekar, M. R., Sureshbabu, K. and Sankaranarayanan, R. (2006) Posttransfer editing mechanism of a D-aminoacyl-tRNA deacylase-like domain in threonyl-tRNA synthetase from archaea. *EMBO J.* **25**, 4152-4162.
39. Roy, S., Aravind, P., Madhurantakam, C., Ghosh, A. K., Sankaranarayanan, R.\* and Das, A. K.\* (2006) Crystallization and preliminary X-ray diffraction analysis of a protease inhibitor from the haemolymph of the Indian tsar silkworm *Antheraea mylitta*. *Acta Cryst.* **F62**, 669-671.
40. Goyal, A., Yousuf, M., Rajakumara, E., Arora, P., Gokhale, R. S. and Sankaranarayanan, R. (2006) Crystallization and preliminary X-ray crystallographic studies of the N-terminal domain of FadD28, a fatty acyl AMP ligase from *Mycobacterium tuberculosis*. *Acta Cryst.* **F62**, 350-352.
41. Aravind, P., Rajini, B., Sharma, Y. and Sankaranarayanan, R. (2006) Crystallization and preliminary X-ray crystallographic investigations on a  $\beta\gamma$ -Crystallin domain of Absent In Melanoma 1 (AIM1), a protein from *Homo sapiens*. *Acta Cryst.* **F62**, 282-284.
42. Sachdev, M., Sankaranarayanan, R., Reddanna, P., Thangaraj, K. and Singh, L. (2005) Major histocompatibility complex class I polymorphism in Asiatic lions. *Tissue Antigens* **66**, 9-18.
43. Dwivedi, S., Kruparani, S. P. and Sankaranarayanan, R. (2005) A D-amino acid editing module coupled to the translational apparatus in archaea. *Nature Struct. Mol. Biol.* **12**, 556-557.
44. Madhurantakam, C., Rajakumara, E., Mazumdar, P. A., Saha, B., Mitra, D., Wiker, H. G., Sankaranarayanan, R.\* and Das, A. K.\* (2005) Crystal structure of low molecular weight protein tyrosine phosphatase (MPtpA) from *Mycobacterium tuberculosis* at 1.9 Å resolution. *J. Bacteriol.* **187**, 2175-2181.
45. Dwivedi, S., Kruparani, S. P. and Sankaranarayanan, R. (2004) Cloning, expression, purification, crystallization and preliminary X-ray crystallographic investigations on a unique editing domain from Archaeobacteria. *Acta Cryst.* **D60**, 1662-1664.
46. Acharya, P., Rajakumara, E., Sankaranarayanan, R.\* and Rao, N. M.\* (2004) Structural basis for selection and enhanced thermostability of laboratory evolved *Bacillus subtilis* lipase. *J. Mol. Biol.* **341**, 1271-1281.
47. Sankaranarayanan, R.\*, Saxena, P., Marathe, U., Gokhale, R. S.\*, Shanmugam, V. M. and Rukmini, R. (2004) A novel tunnel in mycobacterial type III polyketide synthase reveals the structural basis for generating diverse metabolites. *Nature Struct. Mol. Biol.* **11**, 894-900.
48. Rukmini, R., Shanmugam, V. M., Saxena, P., Gokhale, R. S. and Sankaranarayanan, R. (2004) Crystallization and preliminary X-ray crystallographic investigations of an unusual type III polyketide synthase PKS18 from *Mycobacterium tuberculosis*. *Acta Cryst.* **D60**, 749-751.

49. Rajakumara, E., Acharya, P., Ahmad, S., Shanmugam, V. M., Rao, N. M.\* and Sankaranarayanan, R.\* (2004) Crystallization and preliminary X-ray crystallographic investigations on several thermostable forms of a *Bacillus subtilis* lipase. *Acta Cryst.* **D60**, 160-162.
50. Chatterjee, S., Sankaranarayanan, R. and Sonti, R. V. (2003) PhyA, a secreted protein of *Xanthomonas oryzae* pv. *oryzae*, is required for optimum virulence and growth on phytic acid as a sole phosphate source. *Molecular Plant-Microbe Interactions* **16**, 973-982.
51. Torres-Larios, A., Sankaranarayanan, R., Rees, B., Dock-Bregeon, A-C. and Moras, D. (2003) Conformational movements and cooperativity upon amino acid, ATP and tRNA binding in threonyl-tRNA synthetase. *J. Mol. Biol.* **331**, 201-211.
52. Caillet, J., Nogueira, T., Masquida, B., Winter, F., Graffe, M., Dock-Bregeon, A-C., Torres-Larios, A., Sankaranarayanan, R., Westhof, E., Ehresmann, B., Ehresmann, C., Romby, P. and Springer, M. (2003) The modular structure of *Escherichia coli* threonyl-tRNA synthetase as both an enzyme and a regulator of gene expression. *Mol. Microbiol.* **47**, 961-974.
53. Torres-Larios, A., Dock-Bregeon, A-C., Romby, P., Rees, B., Sankaranarayanan, R., Caillet, J., Springer, M., Ehresmann, C., Ehresmann, B. and Moras, D. (2002) Structural basis of translational control by *Escherichia coli* threonyl tRNA synthetase. *Nature Struct. Biol.* **9**, 343-347.
54. Sankaranarayanan, R. and Moras, D. (2001) Solution to the double discrimination problem by the class II threonyl-tRNA synthetase. *Med Chem Res.* **10**, 516-523.
55. Dock-Bregeon, A-C., Sankaranarayanan, R., Romby, P., Caillet, J., Springer, M., Rees, B., Francklyn, C. S., Ehresmann, C. and Moras, D. (2000) Transfer RNA-mediated editing in threonyl-tRNA synthetase: The class II solution to the double discrimination problem. *Cell* **103**, 877-884.
56. Sankaranarayanan, R., Dock-Bregeon, A-C., Rees, B., Bovee, M., Caillet, J., Romby, P., Francklyn, C. S. and Moras, D. (2000) Zinc ion mediated amino acid discrimination by threonyl-tRNA synthetase. *Nature Struct. Biol.* **7**, 461-465.
57. Sankaranarayanan, R., Dock-Bregeon, A-C., Rees, B., Bovee, M., Caillet, J., Romby, P., Francklyn, C. S. and Moras, D. (2000) Zinc ion mediated amino acid recognition by threonyl-tRNA synthetase. *Acta Cryst.* **A56**, S-93.
58. Arnez, J. G., Sankaranarayanan, R., Dock-Bregeon, A-C., Francklyn, C. S. and Moras, D. (2000) Aminoacylation at the atomic level in class IIa aminoacyl-tRNA synthetases. *J. Biomol. Struct. Dyn.* **1**, 23-27.
59. Sankaranarayanan, R., Dock-Bregeon, A-C., Romby, P., Caillet, J., Springer, M., Rees, B., Ehresmann, C., Ehresmann, B. and Moras, D. (1999) The structure of threonyl-tRNA synthetase-tRNA<sup>Thr</sup> complex enlightens its repressor activity and reveals an essential zinc ion in the active site. *Cell* **97**, 371-381.
60. Prabu, M.M., Sankaranarayanan, R., Puri, K.D., Sharma, V., Surolia, A., Vijayan, M. and Suguna, K. (1998) Carbohydrate specificity and quaternary association in basic winged bean lectin: X-ray analysis of the lectin at 2.5 Å resolution. *J. Mol. Biol.* **276**, 787-796.
61. Suresh, S., Rani, P. G., Pratap, J. V., Sankaranarayanan, R., Surolia, A. and Vijayan M. (1997) Homology between jacalin and artocarpin from jackfruit (*Artocarpus*

- integrifolia*) seeds. Partial sequence and preliminary crystallographic studies of artocarpin. *Acta Cryst.* **D53**, 469-471.
62. Sankaranarayanan, R., Sekar, K., Banerjee, R., Sharma, V., Surolia, A. and Vijayan, M. (1996) A novel mode of carbohydrate recognition in jacalin, a *Moraceae* plant lectin with a  $\beta$ -prism fold. *Nature Struct. Biol.* **3**, 596-603.
63. Vijayan, M.\*, Sekar, K., Banerjee, R., Mahanta, S.K., Surolia, A. and Sankaranarayanan, R. (1996) A three-fold symmetric  $\beta$ -prism fold without internal sequence homology in the structure of the two-chain lectin, Jacalin. *Acta Cryst.* **A52**, C-147.
64. Sankaranarayanan, R., Puri, K. D., Ganesh, V., Banerjee, R., Surolia, A. and Vijayan, M. (1993) Crystallization and preliminary X-ray studies of the basic lectin from winged bean (*Psophocarpus tetragonolobus*). *J. Mol. Biol.* **229**, 558-560.

## Reviews, News and Views articles and book sections

1. Priyadarshan, K. and Sankaranarayanan, R. (2018) Fatty acyl-AMP ligases as mechanistic variants of AMN superfamily and molecular determinants dictating substrate specificities. *Journal of the Indian Institute of Science* (**in press**).
2. Routh, S. B. and Sankaranarayanan, R. (2017) Editing and proofreading in translation. Reference Module in Life Sciences. <http://dx.doi.org/10.1016/B978-0-12-809633-8.06374-3>.
3. Routh, S. B. and Sankaranarayanan, R. (2017) Mechanistic insights into catalytic RNA-protein complexes involved in translation of the genetic code. *Adv. Protein Chem. Struct. Biol.* **109**, 309-353.
4. Priyadarshan, K., Haque, A. S., Rukmini, R. and Sankaranarayanan, R. (2014) Structural remodeling creates diversity in lipid repertoire of *Mycobacterium tuberculosis*. *Journal of the Indian Institute of Science* **94**, 139-148.
5. Routh, S. B., Ahmad, S. and Sankaranarayanan, R. (2013) D-amino acids: Occurrence, stereochemistry and exclusion from translational machinery. *Biomolecular Forms and Functions - A celebration of 50 years of the Ramachandran Map*. Edited by: Manju Bansal and N. Srinivasan. IISc Press - WSPC Publication, pp. 247-263.
6. Arora, A., Chandra, N. R., Das, A., Gopal, B., Mande, S. C.\*, Prakash, B., Ramachandran, R., Sankaranarayanan, R., Sekar, K., Suguna, K., Tyagi, A. K. and Vijayan, M. (2011) Structural biology of *Mycobacterium tuberculosis* proteins: The Indian efforts. *Tuberculosis* **91**, 456-468.

7. Mohanty, D., Sankaranarayanan, R. & Gokhale, R. S. (2011) Fatty acyl-AMP ligases and polyketide synthases are unique enzymes of lipid biosynthetic machinery in *Mycobacterium tuberculosis*. *Tuberculosis* **91**, 448-455.
8. Gokhale, R. S., Sankaranarayanan, R. and Mohanty, D. (2007) Versatility of polyketide synthases in generating metabolic diversity. *Current Opin. Struct. Biol.* **17**, 736-743.
9. Sankaranarayanan, R. (2006) A type III PKS makes the DIFference. *Nature Chem. Biol.* **2**, 451-452 (**Invited NEWS and VIEWS article**).
10. Sankaranarayanan, R. and Moras, D. (2001) The fidelity of the translation of the genetic code. *Acta Biochimica Polonica* **48**, 323-335.
11. Sankaranarayanan, R. and Moras, D. (1999) Modular organization of aminoacyl-tRNA synthetases. Perspectives in structural biology Ed. Vijayan, M., Yathindra, N. and Kolaskar, A. S. Universities Press (India) Limited, pp 128-138.

## **Presentations**

Delivered **Sir J. C. Bose Memorial Lecture** at NIPGR, New Delhi on the Foundation day on 30<sup>th</sup> November, 2017.

Delivered **Prof. MR Das Memorial Lecture of INSA** at Banaras Hindu University on 13, November, 2017.

Chaired a session and delivered an invited talk at the **IUBMB focussed meeting on AARS-2017** held at Clearwater, Florida, USA from 29 October to 2 November, 2017.

Delivered **Prof. A. K. Lala Memorial Lecture** at IIT, Bombay on 13<sup>th</sup> September, 2017.

Invited speaker at the **5<sup>th</sup> Asia Pacific Protein Association (APPA) conference** held at Bansaen, Thailand during 11-14, July, 2017.

Invited speaker at the **international tRNA meeting** held at Jeju, South Korea during 4-8, September, 2016.

Invited speaker at **MCB-75** to celebrate the 75 years of MCBL department of IISc, Bangalore during 11-14, December, 2015.

Chair and invited speaker at the **Asian Crystallographic Association meeting (AsCA-2015)** held at Science City, Kolkata during 5-8, December, 2015.

Invited speaker at the **FAOBMB meeting** held at BITS Hyderabad Campus, Hyderabad from 27-30, November, 2015.

Invited speaker at the '**Institute of Protein Research, Osaka and Australian National University, Canberra**' joint symposium held at Canberra during 14-16 November, 2015.

Invited speaker at the **aaRS-2015 meeting** held at Barcelona, Spain from 18-22nd October, 2015.

Invited speaker at the 10th **International Symposium on Bio-Organic Chemistry (ISBOC-10)**, under the aegis of IUPAC, held at IISER, Pune from 11-15 January, 2015.

Invited to deliver the **GN Ramachandran Award Lecture** at the IUPAB-International Biophysics Congress held at Brisbane, Australia during 3 - 7 August, 2014.

Invited **Platinum Jubilee Award Lecture** at the 100th Indian Science Congress held at Kolkata from 3rd to 7th January, 2013.

Invited as a Session Organizer for the **Indo-American Kavli Frontiers of Science Symposium** organized by National Academy of Sciences, USA at Beckman Centre, Irvine from 17<sup>th</sup> to 20<sup>th</sup> April, 2011.

Invited speaker at the ‘**Asian Biophysics Association**’ meeting held at India Habitat Center, New Delhi from 30<sup>th</sup> January to 2<sup>nd</sup> February, 2011.

Invited session chair on ‘Combining methods/new tools in structural biology’ at the **Asian Crystallography Association (AsCA-2010) meeting** held at Busan, South Korea from 31<sup>st</sup> October to 4<sup>th</sup> November, 2010.

Presented an invited talk entitled ‘Evolution of virulence properties using old folds in pathogenic bacteria’ at the **International conference on Microbial Biotechnology (MICROCON-2009)** held at Panjab University, Chandigarh from 3<sup>rd</sup> to 4<sup>th</sup> March, 2009.

Invited session chair on ‘Protein-Nucleic acid interactions’ at the **International Union of Crystallography (IUCr) congress and general assembly** held at Osaka, Japan from 23<sup>rd</sup> to 31<sup>st</sup> of August 2008.

Presented an invited lecture entitled ‘Structure-function analysis of enzymes involved in the complex lipid cell wall synthesis of Mycobacterium tuberculosis’ at the joint **4<sup>th</sup> AOHUPO (Asia Oceania Human Proteome Organization) and 2<sup>nd</sup> PRICPS (Pacific Rim International Conference on Protein Science)** held at Cairns Convention Centre, Australia from 22<sup>nd</sup> to 26<sup>th</sup> June, 2008.

Presented an invited lecture entitled ‘Rational design for enantioselectivity: A lesson from nature’ at the 6<sup>th</sup> Temasek Life Sciences symposium on Biotechnology: Innovative applications from basic research held at **Temasek Life Sciences Laboratory, Singapore** from 24-25<sup>th</sup> January, 2008.

Presented a **plenary lecture** entitled ‘Structural basis for proofreading during translation of the genetic code’ in the **76<sup>th</sup> SBC (Society of Biological Chemists, India) meeting** held at Sri Venkateshwara University, Tirupati from 25<sup>th</sup>-27<sup>th</sup> November, 2007.

Presented an invited talk entitled ‘Inverting enantioselectivity in modules responsible for enforcing a high fidelity during translation’ at the **EMBL, Hamburg, Germany** on 14<sup>th</sup> September, 2007.

Invited popular lecture on ‘Physics of Living Matter’ on the **Indian Academy of Sciences** sponsored lecture programme from 19<sup>th</sup> to 20<sup>th</sup> July 2007 organized by Aurora Degree and PG College, Hyderabad to Graduate and Post graduate students.

Invited as a session chair and to present a talk on ‘Macromolecular Machines’ at the **Indo-American Frontiers of Science Symposium** at University of California, Irvine from 18<sup>th</sup> to 20<sup>th</sup> January, 2007.

Invited talk entitled ‘Inverting enantioselectivity in modules responsible for enforcing a high fidelity during translation of the genetic code’ at the **RNA group, Ohio State University, Columbus, USA** on the 10<sup>th</sup> October, 2006.

Presented an invited talk entitled 'A single residue enantioselectivity switch in a domain enforcing homochirality during translation of the genetic code' in the **International Symposium on Recent Trends in Macromolecular Structure and Function (ISRTMSF)** held at Guindy Campus, University of Madras, Chennai from 18<sup>th</sup> to 20<sup>th</sup> January, 2006.

Invited as a Session Chair and also to present a talk in the '**21<sup>st</sup> International tRNA meeting**' held between 2-7, December 2005 at the Indian Institute of Science, Bangalore.

Presented an invited talk entitled 'Structure-function studies on enzymes involved in the complex lipid cell wall biosynthesis of *Mycobacterium tuberculosis*' in the **Symposium on 'Tuberculosis Research – An Indian perspective'** organized by Astra Zeneca at Bangalore on the 20<sup>th</sup> October, 2005.

Presented an invited talk entitled 'A novel substrate binding tunnel reveals the structural basis for generating diverse metabolites by a type III polyketide synthase from *Mycobacterium tuberculosis*' at **IGBMC, Strasbourg, France** on 22<sup>nd</sup> September, 2004.

Presented an invited talk entitled 'A novel tunnel in mycobacterial PKS18 reveals the structural basis for generating diverse metabolites' in the **International Conference on 'Structural Biology at Crossroads: From Biological molecules to Biological Systems'** held at **EMBL, Hamburg, Germany** from 15<sup>th</sup> to 18<sup>th</sup> of September, 2004.

Presented an invited talk entitled 'Exploring the Structural basis of enhanced thermostability in *Bacillus subtilis* lipase' in the **International Symposium on Recent Trends in Macromolecular Structure and Function (ISRTMSF)** held at Guindy Campus, University of Madras, Chennai from 19<sup>th</sup> to 23<sup>rd</sup> January, 2004.

Presented an invited talk entitled 'Structural basis of how threonyl-tRNA synthetase acts as a translational repressor and solves a crucial double discrimination problem for a faithful translation of the genetic code' in the **Institute of Molecular and Cell Biology (IMCB)**, Singapore on the 7<sup>th</sup> July, 2003.

Presented an invited talk entitled 'How Threonyl-tRNA Synthetase Solves a Crucial Double Discrimination Problem to Ensure a High Fidelity During Translation of The Genetic Code?' in the **School of Biological Sciences, Nanyang Technological University (NTU)**, Singapore on the 5<sup>th</sup> July, 2003.

Presented a talk entitled 'Unexpected conformational movements upon substrate binding by the class II threonyl-tRNA synthetase' in the 4th tRNA Synthetase meeting on "**tRNA Synthetases in Biology, Medicine, and Evolution**" held at the Asilomar Conference Center, Monterey, California, U. S. A. January 13<sup>th</sup> -18<sup>th</sup>, 2002.

Presented a talk entitled 'Solution to the double discrimination problem by the class II threonyl-tRNA synthetase' in the international symposium on **Current Trends in Drug**

**Discovery Research** (CTDDR-2001) organized by the Central Drug Research Institute, Lucknow, India, 11<sup>th</sup> – 15<sup>th</sup> February, 2001.

Presented a talk entitled ‘The fidelity in the translation of the genetic code’ in a meeting on the **Molecular architecture of evolution** organized by the Polish Academy of Sciences in The Institute of Bio-organic chemistry, Poznan, Poland, 29<sup>th</sup> – 31<sup>st</sup> October, 2000.

Presented a talk entitled ‘Zinc ion mediated amino acid recognition by threonyl-tRNA synthetase’ in **European Crystallographic Meeting** (ECM-19), Nancy, France, 25<sup>th</sup> – 31<sup>st</sup> August, 2000.

Presented a talk entitled ‘Crystal structure of threonyl-tRNA synthetase-tRNA<sup>Thr</sup> complex from *E. coli*’ in the Fifth IUPAC international symposium on **Bio-organic chemistry ISBOC-5** held at National chemical laboratory, Pune, 30<sup>th</sup> Jan – 4<sup>th</sup> Feb, 2000.

Presented a talk entitled ‘Structure of *E. Coli* Threonyl-tRNA synthetase’ in the 12<sup>th</sup> Regio meeting on **X-ray crystallography of Biomacromolecules**, Strasbourg, France 30<sup>th</sup> Sept – 2<sup>nd</sup> October, 1998.

Presented a talk entitled ‘Structural studies on Lectins’ in the **Asian Regional Seminar on Crystallography in Molecular Biology**, University of Madras, Madras, 9<sup>th</sup> – 14<sup>th</sup> December, 1993.