

CURRICULUM VITAE

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Educational background

2/2003 to 5/2003 Visiting fellow - Tata Institute of Fundamental Research, Mumbai, India

1997-2/2003 Ph. D. in Physical Chemistry - Tata Institute of Fundamental Research, Mumbai, India

1995-1997 M.Sc. in Chemistry - University of Hyderabad, Hyderabad, India

1992-1995 B.Sc. in Maths, Physics and Chemistry - Govt. College, Rajahmundry, India

Present position: Postdoctoral Research Fellow in Prof. Julio M. Fernandez's laboratory (<http://www.columbia.edu/cu/biology/faculty/fernandez/FernandezLabWebsite>) at Columbia University, New York since May 2003.

Research Experience

5/2003- Present: Prof. Juio M. Fernandez's laboratory, Columbia University.

I have constructed polyproteins of dihydrofolate reductase (DHFR) and green fluorescent protein (GFP) using polyprotein engineering and molecular biology. I have also investigated their mechanical properties by single molecule force spectroscopy. We have found out that the mechanical stability of DHFR depends on the ligand binding and it is not an additive property when multiple ligands bind DHFR simultaneously. Unexpectedly, GFP unfolds at very low force (~90pN) upon mechanical stretching.

1997-5/2003: Ph. D. work and other projects

Protein purification and characterization

During my **visiting student research programme (1996) fellowship**, I worked on isolation and purification of Lactoperoxidase (LPO) enzyme which belongs to the important class of peroxidases. Characterization of LPO was done by absorption, fluorescence and circular dichroism.

NMR Studies on Truncated Sequences of Human Telomeric DNA: Observation of a Novel A-Tetrad

I have synthesized two truncated human telomeric DNA sequences, d-AG₃T and d-TAG₃T by solid-phase synthesis and purified by standard procedures. NMR data were

obtained on a 600MHz spectrometer and model building studies were done for the quadruplex structures for the above two sequences. We observed a novel A-tetrad in d-AG₃T for the first time and the publication which came out of this work got very good recognition internationally. [P.K. Patel, **A.S.R. Koti** and R.V. Hosur (1999) *Nucleic Acids Research* **27** 3836].

Summary of PhD work

My thesis title is “*Fluorescence Spectroscopy and Dynamics of Organic Molecules in Complex Systems*” and completed PhD under the supervision of Prof. N. Periasamy (www.tifr.res.in/~peri).

Time Resolved Area Normalized Emission Spectroscopy (TRANES)

My PhD work consists of development of a new analytical technique called 'Time Resolved Area Normalized Emission Spectroscopy (TRANES)' and its application to complex systems like a probe distribution in biological membranes. With the help of TRANES we can answer the question 'how many number of emissive species are there?' in a complex system. TRANES requires wavelength dependent fluorescence lifetimes (we use Time Correlated Single Photon Counting (TCSPC) method for experiments) and further analysis to determine the number of emissive species with the help of isoemissive points. We have established TRANES by giving a complete theory and verified this theoretical formulation by multi-component simulated systems [Koti *et al.*, *J. Phys. Chem. A* **105** (2001) 1767 and Koti *et al.*, *J. Chem. Phys.* **115** (2001) 7094]. Recently we have investigated membrane heterogeneity and dynamics by TRANES using various fluorescence probes.

Molecular Aggregates of Porphyrin and Cyanines (Material Science)

I have also worked on J- and H- aggregates of porphyrin and cyanine dyes. We have succeeded in making mixed-aggregates of porphyrin and cyanines and also in determining the stoichiometry of these aggregates. These molecular aggregates have potential applications in opto-electronics. We also synthesized supramolecular assemblies of porphyrin aggregates on templates such as poly-Lysine. We have characterized these aggregates using various techniques like absorption and fluorescence spectroscopy, DLS and AFM [Koti *et al.*, *J. Mater. Chem.* **12** (2002) 2312].

Technical Experience

During my experimental work, I have got myself acquainted with tunable pulsed light sources [CW mode-locked frequency-doubled Nd:YAG system (Spectra Physics) driven dye (Rhodamine 6G) system which generates 4-10ps pulses at 800kHz/4MHz or a CW mode Nd:Vanadate (Millenia, Spectra Physics, USA) pumped mode-locked Ti-Sapphire system]. Apart from fluorescence techniques, I am also familiar with NMR, CD, DLS, AFM etc. Also I have the experience of handling various samples ranging from dyes to organic/inorganic/bio-polymers such as DNA and proteins.

I am quite familiar to, and enjoy doing programming in C, C++, visual C++. I have written various analysis programs in 'C language' for TRANES in my PhD work. I have been recently doing quantum mechanical calculations using packages like HyperChem.

Time resolved fluorescence studies on the protein Ncp7 of HIV-1 (Experience of working in France)

I have the experience of working with Prof. Yves Mély at UMR 7034 CNRS, Faculté de Pharmacie, ILLKIRCH, France. We performed time resolved fluorescence studies on several derivatives of the nucleocapsid protein (Ncp7) of HIV-1. We investigated the ground-state heterogeneity of the Trp residues of Ncp7 [manuscript under preparation].

Curricular/Academic Achievements

1. Gold Medal in Bachelor of Science
2. All India Merit Scholarship for post graduation, Govt. of India (1995-1997)
3. Visiting Student's Research Programme (VSRP) Scholarship from Tata Institute of Fundamental Research (1996)
4. Gold-Medal in M.Sc. (Chemistry) from University of Hyderabad (1997)
5. National CSIR fellowship for Junior Research fellowship and Lecturership by the Council for Scientific and Industrial Research, HRD group, Govt. of India (1997)
6. Best Poster Award in the "Trombay Symposium for Radiation and Photochemistry", at BARC, Mumbai India (1999)
7. Travel grant from Sarojini Damodaran International Fellowship Programme in 2001 to attend the international conference, 'Methods and Applications in Fluorescence: Spectroscopy, Imaging and Probes', which was held in Amsterdam, The Netherlands

Publications

1. Prasanta K. Patel, **A.S.R. Koti** and R.V. Hosur, NMR studies on truncated sequences of human telomeric DNA: observation of a novel A-tetrad, *Nucleic Acids Research*, Vol. **27**, No. **19** (1999) p3836-3843.
2. **A.S.R. Koti** and N. Periasamy, Solvent Exchange in Excited-State Relaxation in Mixed Solvents, *Journal of Fluorescence*, Vol. **10**, No. **2** (2000) p177-184.
3. **A.S.R. Koti**, B. Bhattacharjee, N.S. Haram, Ranjan Das, N. Periasamy, N.D. Sonawane, D.W. Rangnekar, Photophysics of some styryl thiazolo quinoxaline dyes in organic media, *Journal of Photochemistry and Photobiology A: Chemistry*, Vol. **137** No. **2-3** (2000) p115-123.
4. **A.S.R. Koti**, M.M.G. Krishna and N. Periasamy, Time-Resolved Area-Normalized Emission Spectroscopy (TRANES): A Novel Method for Confirming Emission from Two Excited States, *J. Phys. Chem. A*, Vol. **105** (2001) p1767-1771.
5. **A.S.R. Koti** and N. Periasamy, TRANES Analysis of the Fluorescence of Nile Red in Organized Molecular Assemblies Confirms Emission from Two Species, *Proc. Indian Acad. Sci., (Chem. Sci.)* Vol. **113**, No. **2** (2001) p157-163.
6. **A.S.R. Koti** and N. Periasamy, Application of Time Resolved Area Normalized Emission Spectroscopy (TRANES) to multi-component systems, *J. Chem. Phys.* Vol. **115**, No. **15** (2001) p7094-7099.
7. N. Periasamy and **A.S.R. Koti**, Time Resolved Fluorescence Spectroscopy: TRES vs TRANES, *ISRAPS Bulletin* Vol. **12**, No. **1-4** (December 2001) p26-29.
8. **A.S.R. Koti** and N. Periasamy, Cyanine induced Aggregation in *meso*-tetrakis (4-sulphonatophenyl) Porphyrin Anions, *Journal of Materials Chemistry* Vol. **12**, No. **8** (2002) p2312-2317.
9. **A.S.R. Koti** and N. Periasamy, Time Resolved Area Normalized Emission Spectroscopy (TRANES) of DMABN Confirms Emission from Two States, *Research on Chemical Intermediates* Vol. **28**, No. **7-9** (2002) p831-836.
10. Ira, **A.S.R. Koti**, G. Krishnamoorthy and N. Periasamy, TRANES Spectra of Fluorescence Probes in Lipid Bilayer Membranes: An Assessment of Population Heterogeneity and Dynamics, *Journal of Fluorescence* Vol. **13**, No. **1** (2003) p95-103.
11. **A.S.R. Koti** and N. Periasamy, Self-Assembly of Template-Directed J-aggregates of Porphyrin, *Chemistry of Materials* Vol. **15**, No. **2** (2003) p369-371.
12. N. Periasamy and **A.S.R. Koti**, Time Resolved Fluorescence Spectroscopy: TRES and TRANES, *PINSA* Vol. **69**, No. **1**, (2003) p41-48.

13. **A.S.R. Koti**, Jharna Taneja and N. Periasamy, Control of Coherence length and Aggregation size in the J-aggregate of Porphyrin, *Chemical Physics Letters* Vol. **375**, No. **1-2** (2003) p171-176.
14. M.K. Singh, H. Pal, **A.S.R. Koti** and A.V. Sapre, Photophysical Properties and Rotational Relaxation Dynamics of Neutral Red Bound to β -cyclodextrin, *J. Phys. Chem. A*, Vol. **108** (2004) p1465-1474.
15. **Sri Rama Koti Ainavarapu**, Lewyn Li, Carmen L. Badilla and Julio M. Fernandez, Ligand binding modulates the mechanical stability of dihydrofolate reductase (DHFR), *Biophysical Journal* Vol. **89**, No. **5** (2005) p3337-3344.

References

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