

CURRICULUM VITAE

N. V. KRISHNAMURTHY

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PERSONAL

Male, Indian, born on May 5, 1972, Married.

EDUCATION

- Ph.D. in Chemistry, April 2005, Osmania University, Hyderabad, India. "**Synthesis of a few chemiluminescent probes and their application as bioconjugates**" involving the synthesis, characterisation and application of chemiluminescent compounds. Thesis Supervisor: Dr. A. Ram Reddy, Assoc. Professor, Department of Chemistry, Nizam College, Osmania University, Hyderabad, India.
- One year Orientation Course in Basic and Nuclear Sciences, 1995-96, Chemistry Discipline, 39th Batch of Training School, Bhabha Atomic Research Centre, Mumbai, India. Ranked 2nd.
- Project titled "**Absorption and Emission Spectral Studies of Pr³⁺, Ho³⁺ and Eu³⁺ ions in oxyfluoride glasses**" under the supervision of Prof. R. Jaganathan, as part fulfilment of M.Sc degree, April, 1995.
- M.Sc. (Chemistry), 1995, University of Hyderabad, India.
- B.Sc. (Hons.) in Chemistry, 1993, Utkal University, India.

Fellowships:

- 1) COSIST fellowship for topping National Level Entrance examination for admission to M.Sc (Chemistry) Programme at University of Hyderabad, 1993.
- 2) UGC-SAP Merit Scholarship for academic proficiency, M.Sc (Chemistry), University of Hyderabad, 1994.
- 3) Qualified in the Graduate Aptitude Test in Engineering (GATE) examination, in Chemistry, conducted by Department of Education, Ministry of Human Resource Development, Government of India, 1995.
- 4) Qualified in the Junior Research Fellowship examination, CSIR in Chemistry, awarded by Ministry of Human Resources, Government of India, 1995.

JOB PROFILE

- Working as Scientific Officer, Labelled Biomolecules Laboratory, Board of Radiation and Isotope Technology, Department of Atomic Energy, India, since 1996.

AREAS OF INTEREST

- Chemiluminescent and bioluminescent probes in bioanalytical, clinical and medicinal chemistry.
- Chemiluminescent and bioluminescent imaging and therapy.
- Luminescent probes design and application in biology and medicine.
- Avidin-biotin technology in pre-targeting
- Radiopharmaceutical chemistry and nuclear medicine.

RESEARCH EXPERIENCE

- Organic synthesis, purification, characterisation and application of fluorescent and luminescent probes for non-radioactive labelling and detection of biomolecules.
- Synthesis, purification and characterisation of streptavidin conjugates.
- Design of analytical assay procedures based on colorimetric, fluorescent, chemiluminescent and bioluminescent methods.
- Enzymatic synthesis, purification and quality control of ^{32}P and ^{33}P labelled nucleotides.
- Production development and procedure refinement in the radionucleotide production programme.
- Isolation of luciferase protein from Indian firefly
- Synthesis of non-radioactive labelled nucleotides; Biotin-dUTP/UTP and fluorescein-dUTP.
- Team Leader, Radionucleotide Production programme, JONAKI, BRIT.
- Supervision of research projects of M. Sc. students.

PROFESSIONAL SKILLS

- Handling of ^{32}P and ^{33}P at 100mCi levels and trained in the handling of radioisotopes.
- Proficiency in the handling of various radioactive detectors such as GM counters, Liquid Scintillation counters etc.
- Experienced in the safe handling of radioisotopes.
- Well versed in the handling and development of purification methodologies based on HPLC using Photodiode array detector, fluorescence detector and conductivity detector.
- Molecular biology techniques especially related to DNA and proteins. Southern and Western blot analysis of radiolabelled as well as non-radioactive labeled DNA & Proteins.
- DNA and Protein purification by affinity, ion-exchange and gel-filtration based column chromatography.

- Characterization of DNA and Proteins by agarose gel, PAGE and SDS-PAGE.
- Labeling of DNA and RNA by Random priming, Nick translation, transcription and PCR reactions using both radiolabelled and non-radiolabelled probes.
- Well versed with various spectral techniques such as UV-Visible absorption, fluorescence and chemiluminescence.
- Use of instruments such as UV-Visible spectrophotometer, Fluorescence spectrofluorimeter, Luminometer, FT-IR, Gel Documentation system etc.
- Experience in the design, synthesis, purification and characterization of organic compounds by TLC, IR, NMR and mass.
- Synthesis of biotin conjugates and their application in avidin/streptavidin based detection methodologies.
- Possession of good communication and management skills.

LIST OF PUBLICATIONS

I. JOURNAL PUBLICATIONS

1. A “*Clean Up*” procedure involving periodate oxidation in the enzymatic synthesis of chemically pure α -³²P and α -³³P labelled deoxyribonucleotides. T. Muthukumaran, N. V. KrishnaMurthy, T. Sudhaharan and B. Muralidharan, *Applied Radiation and Isotopes*, **63** (1), 2005, 63-69.
2. Speciation and Determination of Sulfate and Elemental Sulfur in Zinc Sulfide by Different Liquid Chromatography Techniques. K. Dash, S. Thangavel, N. V. KrishnaMurthy, S. V. Rao, D. Karunasagar and J. Arunachalam, *Analyst*, **130** (4), 2005, 498-501.
3. Molecular Adducts Between A Few Phenolic Donors and π -Acceptors In Solid-State. A. Ram Reddy, N. V. KrishnaMurthy and B. Bhudevi, *Spectrochimica Acta Part A: Molecular and Biomolecular Spectroscopy*, **63**, 2006, 700-708.
4. Synthesis of chemiluminescent biotinyl naphtho [1,8-de] [1,2] diazepine-1,4-diones, *Indian Journal of Chemistry. Section B*. 2005, (**Accepted, in press**).

II. SYMPOSIUM PROCEEDINGS

- 1) A poster titled “*A cleanup procedure towards the preparation of chemically pure α ³²P and α ³³P labeled deoxy nucleotides*” T.Muthukumaran, N.V.KrishnaMurthy and T.Sudhaharan was presented at Nuclear and Radiochemistry Symposium 2003 (NUCAR-2003) organized by the Indian Association of Nuclear and Allied Scientists, from Feb10-13, 2003 at Bhabha Atomic Research Centre, Mumbai, India.
- 2) Presented a paper titled “*Preparation of Chemiluminescent 2,3-dihydro-6-amino-naphtho[1,8-de] [1,2] diazapine-1,4-dione*” at the National Symposium on the “*Commercialization of Clonal Propagation Technology in Plant Improvement*” conducted at Osmania University, Hyderabad from March 24-26, 2000.
- 3) Lead Paper titled “*Phosphorus 33 Nucleotides as Radiolabels: A perspective*” N. V. KrishnaMurthy, V.V. Murhekar, T. Sudhaharan, R. Seshadri and B. Muralidharan was presented at the First Convention and National Symposium of Indian Society for Nuclear Technology in Animal Sciences on “*Recent Advances in Nuclear and Related Techniques in Animal Sciences*” conducted at Madras Veterinary College, Madras from January 21-23, 1998.

III. A chapter titled “**Applications of Radioisotopes in Biology**” in Fundamentals of Radiochemistry Eds. D.D. Sood, A.V.R. Reddy and N. Ramamoorthy, 2nd Edition, IANCAS, 2003.

PROFESSIONAL BODY MEMBERSHIPS

1. Chemical Research Society of India.
2. Indian Nuclear Society.
3. Indian Association of Nuclear Chemists and Allied Scientists.

REFERENCES

1. *Dr. A. Ram Reddy, Assoc. Professor, Department of Chemistry, Nizam College, Osmania University, Hyderabad- 500 001.India.Tel: + 91-40-27203573.
e-mail: a_ramreddy@yahoo.com*
2. *Dr. N. Ramamoorthy, Head of the Division of Physical and chemical sciences, International Atomic Energy Agency, P. O. Box 100, Wagramer Strasse 5, A-1400 Vienna, Austria. Tel: +431-2600-0; Fax: +431-2600-7.
e-mail: N.Ramamoorthy@iaea.org*
3. *Dr. M. R. A. Pillai, Industrial Applications and Chemistry, International Atomic Energy Agency, P. O. Box 100, Wagramer Strasse 5, A-1400 Vienna, Austria. Tel: +431-2600-0; Fax: +431-2600-7.
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THESIS: “Synthesis of a few chemiluminescent probes and their application as bioconjugates” under the supervision of Dr. A. Ram Reddy, Assoc. Professor, Department of Chemistry, Osmania University, Hyderabad, India.

Abstract:

The last few decades has seen the emergence of fluorescent and chemiluminescent labels as suitable alternatives to radiolabels. We have made an attempt to synthesize the naphthalene analog of luminol and its nitro and amino derivatives. The synthesis of 2,3-dihydronaphtho[1,8-de][1,2]diazepine-1,4-dione (**II**) and its 6-nitro (**III**) and 6-amino (**IV**) derivatives was carried out starting from 1,8-naphthoic anhydride. The compounds were characterized by elemental analysis, IR, NMR and mass spectral data. The spectral properties of the compounds were evaluated. The electronic absorption, fluorescence and chemiluminescence properties of the compounds were studied, with an aim to employ these compounds as fluorogenic and chemiluminogenic probes. It was found that **IV** was better suited as a biological probe, in terms of fluorescence and chemiluminescence spectral properties. It was observed that though luminol gives higher chemiluminescent light output, **IV** is a better probe at pH 12. The higher Stokes shift and the relatively larger lifetime of emission make **IV** a better fluorophore. Its sensitivity at selective pH 10 and 12 and the reduced chemiluminescent decay rates are an added advantage of **IV** over luminol.

The compound **IV**, was conjugated to biotin and 5 new compounds **BAH-0**, with no spacer; **BAH-6**, with 6 carbon atoms; **BAH-7**, with 7 carbon atoms; **BAH-10**, with 10 carbon atoms and **BAH-12**, with 12 carbon atom spacer between biotin and **IV** were prepared. The biotin conjugates were characterized by elemental analysis, IR, NMR and mass spectral data. The electronic absorption, fluorescence and chemiluminescence data of the conjugates were studied in comparison to **IV**. The optimum geometry of the conjugates was analysed using MOPAC and it was found that they exist in a closed conformation. The conjugate compounds exhibited favourable fluorescence properties with respect to large Stokes shift and emission at longer wavelengths. The conjugates exhibit a novel chemiluminescence property. On conversion of the amine group of **IV** to an amide group in the conjugates, the chemiluminescence is enhanced in some conjugates. This is an advantage over luminol. This can be preferentially used for estimation of compounds at higher pH. The conjugates can be used as probes in various techniques based on avidin-biotin technology. The conjugates were used in a variety of biological applications including southern hybridisation for the detection of biotinylated DNA.