Ramu V Ranga Naidu Chinta
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National Institute of Science Education and Research (NISER), Bhubaneswar, Odisha-752050.

R&D PROFESSIONAL (SYNTHETIC ORGANIC CHEMISTRY)

Seeking a challenging and rewarding opportunity with a team which recognizes and utilizes my true potential while nurturing my technical and analytical skills

EDUCATION AND RESEARCH

2015 to till date (Thesis Submitted)
Ph.D – Synthetic organic Chemistry
Thesis title "Naphthalimide, naphthaldehyde and benzaldehyde based fluorescent materials: Synthesis of 1,2-disubstituted ferrocenes from ferrocenyl *p*-tolyl sulphoxide"
Supervisor: Dr. V. Krishnan,
NISER, Bhubaneswar, Odisha, India.

2014
Project Fellow-III
NISER, Bhubaneswar, Odisha, India.

2008 – 2010
M.Sc – Organic Chemistry (First class),
Andhra University, Visakhapatnam, India.

2005 – 2008
B.Sc- Maths, Physics, Chemistry (Second class),
Andhra University, Visakhapatnam, India.

RESEARCH SKILLS

- Expertise in handling air and moisture sensitive reactions using Shlenk techniques
- Well-versed in purification methods such as Thin-Layer Chromatography, Column Chromatography, Fractional distillation and Recrystallization.
- Experience in handling instruments such as HPLC and GPC, Glove box (Mbraun Unilab), UV-Fluoroscence, IR-spectrophotometer (Perkin Elmer)
- Conversant with commonly used softwares: ChemDraw, MestReNova, Sci-Finder, EndNote, OriginPro 8.5, Olex2, Diamond and operating systems.
- Personal ability: Maintain good interpersonal relationships with capable of performing in part of group or independent work.

SYNTHETIC SKILLS

- During my doctoral studies, I have done considerable number of organic reactions. Among them few are
  - Coupling reactions (Suzuki, Stille, Negishi copling)
  - Handled organometallic reagents (Grignard, *n*-BuLi, *t*-BuLi, LDA)
  - Dry solvent purification methods.
  - Side chain polymers synthesis, Electrophilic borylation, Mercuration.

LIST OF PUBLICATIONS

1. **Ranga Naidu Chinta, R. V.**; Aradhyula, B. P. R; Murali, A. C; Venkatasubbaiah, K. Synthesis, photophysical and electrochemical properties of naphthaldimine based boron complexes. *J. Organomet. Chem*. **2019,** *891*, 20-27.

2. Sathesh, V.[1]; **Ranga Naidu Chinta, R. V.**[1]; Mamidala, R.; Mukundam, V.; Dhanunjayarao, K.; Venkatasubbaiah, K. Mercuration of ferrocenyl- p -tolyl sulfoxide and its conversion to 1,2-disubstituted ferrocenes. *J. Organomet. Chem*. **2017**, *853*, 74-80 (Equal contribution).

3. Aradhyula, B. P. R[1].; **Ranga Naidu Chinta, R. V.**[1]; Dhanunjayarao, K; Venkatasubbaiah, K, .*RSC Advances*. **2020**, *10*, 13149-13154 (Equal contribution).

4. Dhanunjayarao, K; Mukundam, V; **Ranga Naidu Chinta, R. V.**; Venkatasubbaiah, K, Synthesis of highly fluorescent imidazole based diboron complex. *J. Organomet. Chem.* **2018,** *865*, 234-238.

5. **Ranga Naidu Chinta, R. V.**; Venkatasubbaiah, K. Synthesis, photophysical and electrochemical properties of functionalization on the boron centre: Naphthalimide imidazole boron complexes (manuscript under preparation)

6. **Ranga Naidu Chinta, R. V.**; Venkatasubbaiah, K. Synthesis and characterization of tetraaryl substituted imidazole based boron polymers (manuscript under preparation)

PROFESSIONAL INFORMATION

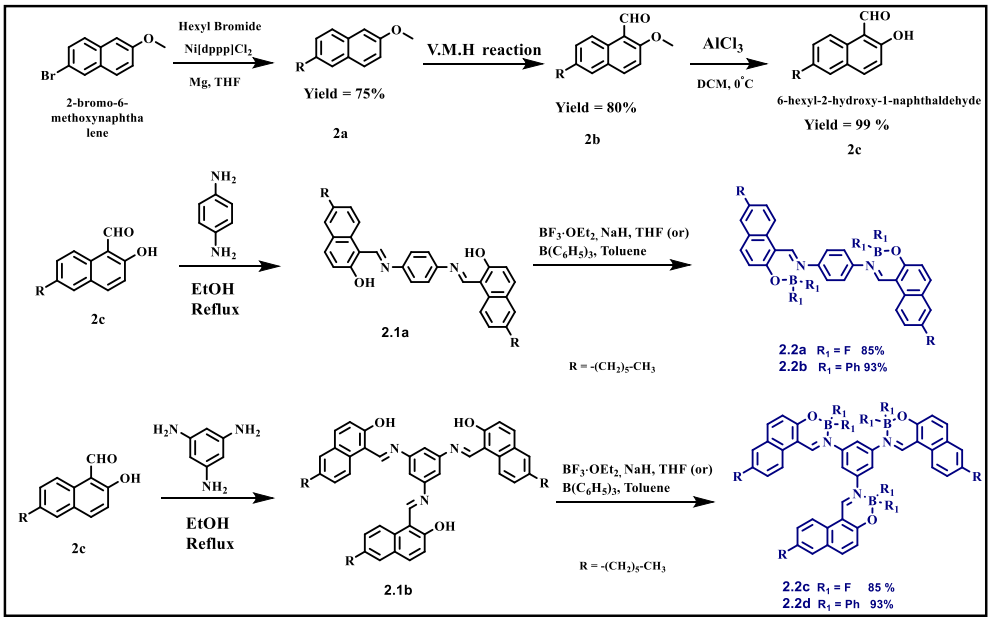
Father's Name	: Jagannadham Naidu
Date of Birth	: 10th Aug 1988
Marital Status	: Married
Nationality	: Indian
Permanent Address	: Naguru(Vill), Vizianagaram (Dist), Andhra Pradesh. PIN Code-535525, India.

SUMMARY OF RESEARCH

1) Introduction: The boron based fluorescent materials classified as tri- and tetra- coordinated boron complexes. According to the chelating donor atoms, the tetra coordinate boron compounds can be classified as *N,O*-, *N,N*-, *N,C*-, and *O,O*-chelate. The four-coordinated boron compounds show, better stability towards thermal, moisture and air over tri-coordinate boron compounds. The strategies used in the literature will be discussed *N,O*-chelated boron compounds in this part. Second part of this chapter describes a brief introduction of different probes (or) sensors for the detection of fluoride ion. The third part of this chapter describes a brief introduction of planar chiral ferrocene derivatives. Since the pioneering work of Ugis diastereoselective method to generate planar chirality, in this part of chapter, I will discuss different planar chiral ferrocenes reported in the literature.

Chapter-2: Synthesis, characterization of *N,O*-chelated naphthaldimine based boron complexes, and study their photo physical and electrochemical properties.

We have synthesized *N,O*-chelated naphthaldimine based boron complexes (2.2a-2.2d) from their Schiffbase ligands (scheme 1). The synthesized difluoroboron complexes (2.2a and 2.2c) are obtained using by the reaction of sodium salt of the ligand and $BF_3{\cdot}Et_2O$ (2.1a and 2.1b).



Scheme 1: Synthetic route to compounds (**2.2a-2.2d).**

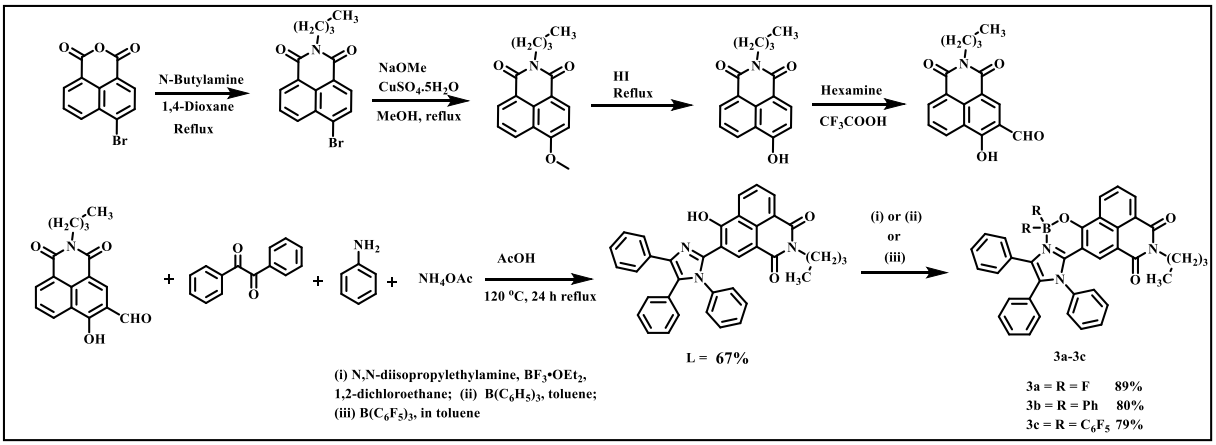
To make diphenyl boron complexes (**2.2b** and **2.2d)** triphenylborane and their corresponding ligands were refluxed under toluene reflux condition (**2.1a** and **2.1b**). In addition to increase the solubility of the ligands we have incorporated hexyl group at naphthalene unit (**2a-2c**). All the boron compounds were characterized by multinuclear NMR, LC-MS, IR, single crystal X-ray diffraction analysis (**2.2b**) and cyclic voltammetry. Photophysical properties in solution describes that borylation enhanced the

quantum yields of the imine ligands.

Ranga Naidu Chinta, R. V.[1].; Aradhyula, B. P. R.; Murali, A. C.; Venkatasubbaiah, K. *J. Organomet. Chem.* **2019**, *891*, 20.

Chapter 3: Synthesis, photophysical and electrochemical properties of naphthalimide imidazole boron complexes.

Naphthalimide (NI) core is considered as one of the most versatile fluorophore unit owing to its unique photo physical properties that has been explored broadly in various real-world applications. This chapter describes the synthesis of naphthalimide imidazole boron complexes. 2-Butyl-5-hydroxy-6-(1,4,5-triphenyl-1H-imidazole-2-yl)-1H-benzo[de]isoquinoline-1,3(2H)-dione based *N,O*-chelated boron complexes (**3a, 3b, 3c**) were readily synthesized through one pot reaction as shown in scheme 2.



Scheme 2: Synthesis of boron complexes (**3a-3c).**

All the boron complexes were characterized by multinuclear NMR, IR, LC-MS, single crystal X-ray diffraction analysis. Photo physical properties were studied in various solvents.

Ranga Naidu Chinta, R. V.; Venkatasubbaiah, K. Synthesis, photophysical and electrochemical properties of functionalization on the boron centre: Naphthalimide imidazole boron complexes. (Manuscript under preparation).

Chapter-4

This chapter is divided into two parts. The first part describes the synthesis and application of poly (tetraphenylimidazole) for the detection of fluoride ion and the second part describes the effect of borylation of poly(tetraphenylimidazole).

Part A: Synthesis and characterization of synthesized poly(tetraphenylimidazole)s and their application in the detection of fluoride ions.

First part of this chapter describe the synthesis and characterization of silyl protected

tetraphenylimidazole monomer 4.3a and it's homo 4.4a and co-polymer 4.5a (Scheme 3). The requisite monomer was accessed by Suzuki-Miyaura cross-coupling of 2-(1-(4-bromophenyl)-4,5-diphenyl-1H-imidazol-2-yl)phenol 4.2a and 4-vinylphenylboronic acid followed by protection of the phenolic group by *tert*-butyl(chloro)diphenylsilane. The desired polymers were readily synthesized by using free radical polymerization. Both the polymers and monomer were characterized using different analytical techniques including multinuclear NMR, GPC (for polymers), and single crystal X-ray crystallography (for the monomer).

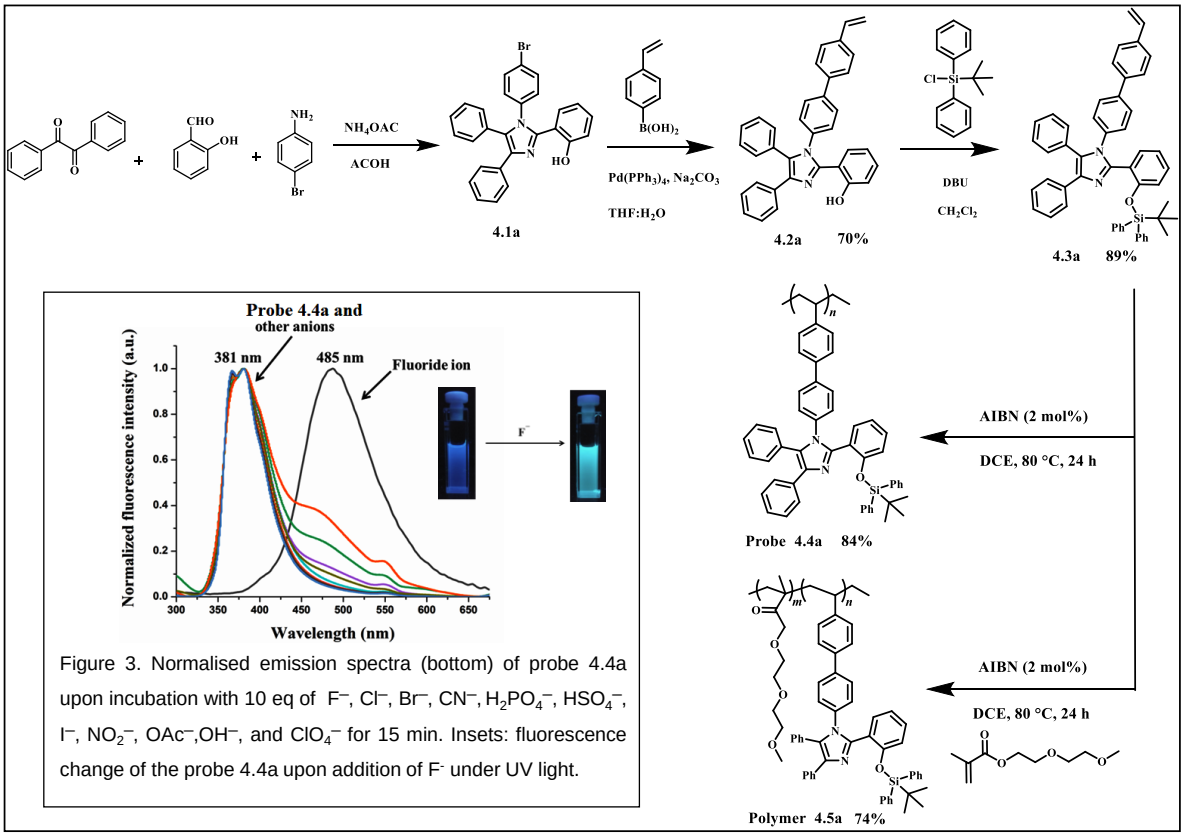


Figure 3. Normalised emission spectra (bottom) of probe 4.4a upon incubation with 10 eq of F^-, Cl^-, Br^-, CN^-, $H_2PO_4^-$, HSO_4^-, I^-, NO_2^-, OAc^-,OH^-, and ClO_4^- for 15 min. Insets: fluorescence change of the probe 4.4a upon addition of F^- under UV light.

Scheme 3: Synthetic route to the probe **4.4a** and Probe **4.5a**

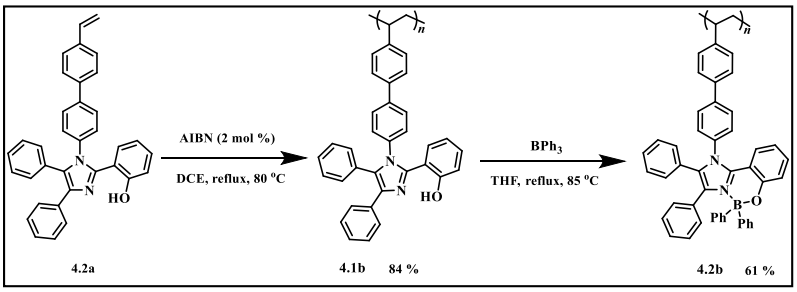
By utilizing the greater fluorophilicity of the silyl atom, the polymers were studied as probes (**4.4a** and **4.5a**) for the detection of fluoride ion. The selectivity and sensitivity of the synthesized polymers were investigated in detail.

Aradhyula, B. P. R[1].; **Ranga Naidu Chinta, R. V.[1]**; Dhanunjayarao, K; Venkatasubbaiah, K, . *RSC Advances*. **2020**, *10*, 13149-13154 (Equal contribution).

Part B: Synthesis and characterization of tetraaryl substituted imidazole based boron polymer.

Second part of this chapter describes synthesis of ESIPT based polymer of 2-hydroxyl-substituted tetra phenylimidazole (**4.1b**) and incorporation of diphenyl boron through *N,O*-chelation. The radical polymerization of monomer **4.2a** results homo polymer **4.1b**. The reaction of **4.1b** with $B(C_6H_5)_3$ resulted the corresponding borylated polymer **4.2b (**Scheme 4). All the compounds were characterized by multinuclear NMR, LC-MS, and gel permeation chromatography (GPC). The photo physical

properties were studied in THF.

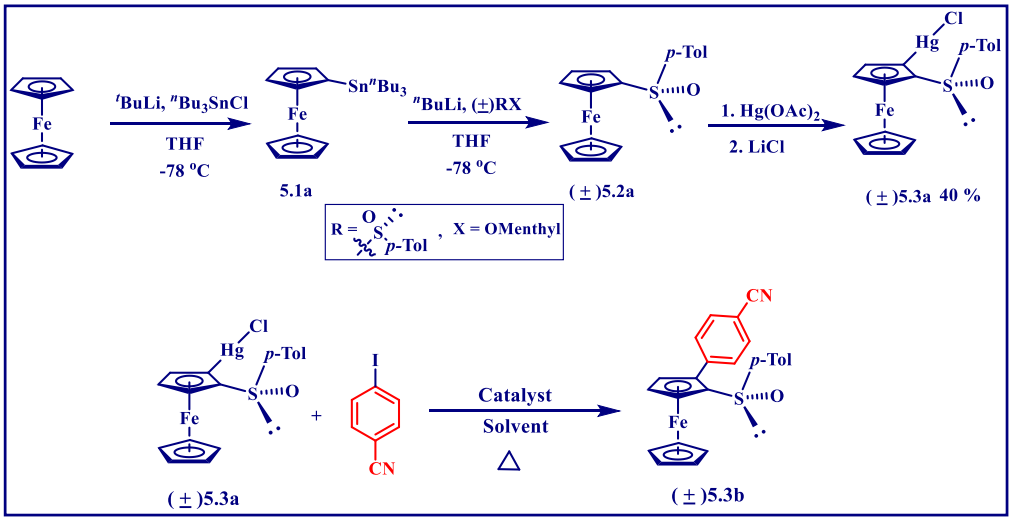


Scheme 4: Synthetic routes to homo polymer (**4.1b**) and its borylated polymer (**4.2b**).

Ranga Naidu Chinta, R. V.; Venkatasubbaiah, K. Synthesis and characterization of tetraaryl substituted imidazole based boron polymers (Manuscript under preparation).

Chapter 5: Synthesis of planar chiral cyclo mercurated ferrocenyl-*p*-tolyl sulfoxide and its conversion to diastereopure 1,2-disubstituted ferrocenes.

The interest in ferrocene and its derivatives grow continuously owing to this versatility in the synthesis of numerous derivatives. Ferrocene derivatives serves as ligands in catalysis especially numerous chiral ligands based on ferrocene have been synthesized and utilized in asymmetric catalysis. Among the different methods available for the synthesis of chiral ferrocenes, the ortho metalation introduced by different chiral auxillaries has been most widely used. In this chapter, I will discuss about the synthesis of diastereomerically pure (R_p,*S*)–1–(*p*–tolylsulfinyl)–2–chloromercuric ferrocene by direct metalation of chiral ferrocenyl sulfoxide. Unlike, ortho lithiation, this reaction can be performed at room temperature in open air.



Scheme 5: Synthetic routes to of DL-1-(aryl)-2-(*p*-tolylsulfinyl) ferrocene.

Cross-coupling reaction of the mercurated compound and aryl iodides resulted planar-chiral ferrocene derivatives with moderate to good isolated yield & good to excellent diastereoselectivities. In order to measure the diastereoselectivities, we also prepared achiral 1,2- ferrocenyl derivatives using the same methodology (Scheme 5).

CARRER ACHIEVEMENTS

- Qualified CSIR – JRF in Dec-2013 with all India rank 54
- Qualified Graduate Aptitude Test in Engineering (GATE) in Feb 2012

CONFERENCES

- **Ranga Naidu Chinta, R. V**[1].; Dhanunjayarao, K. Venkatasubbhaiah, K. In.Modern Trends in Inorganic Chemistry (MTIC) held at CSIR-NCL, Pune and IISER, Pune during 11th-14th December 2017 (**Poster presentation).**

- Sathesh, V.[1], **Ranga Naidu Chinta, R. V**[1], Ramesh, M.; Mukundam, V.; Dhanunjayarao, K. Venkatasubbhaiah, K. In inter IISER & NISER CHEMISTRY MEET (IINCM-2017) held on (22-24)th December 2017 at NISER Bhubaneswar, India (**Poster presentation**).

REFERENCES

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DECLARATION

I do hereby declare that the above mentioned information is correct to the best of my knowledge.

Date: 01-07-2020,

Place: Bhubaneswar, India.

(RAMU V RANGA NAIDU CHINTA)