

Sambasiva Reddy Bheemireddy, Ph.D.

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SUMMARY

Organic/polymer chemist with extensive research experience in design, synthesis, characterization and processing of small molecules and polymers for electronic applications. Experienced in fabrication and testing of Li-ion batteries and redox flow batteries.

PROFESSIONAL EXPERIENCE

Postdoctoral Appointee, Argonne National Laboratory, Lemont, IL Aug 2019 - Present

- Research and development of new small molecules and salts for Li-ion batteries and redox flow batteries.

Research Scientist, Nanosyn, Inc., Santa Clara, CA Mar 2019 - Aug 2019

- Synthetic strategy design and multi-step synthesis of organic small and macro molecules.

Scientist, Seo, Inc. (Subsidiary of Robert Bosch LLC), Hayward, CA Sep 2017 - Mar 2019

- Designed, synthesized and characterized polymers (polyelectrolytes, nano-structured conductive block copolymer separators and binders), oligomers and small molecule additives for fully solid-state Li metal batteries with improved capacity and cycle life.
- Designed and synthesized several small molecule additives including a Li stable lead dioxazolone analogues.
- Synthesized variety of polyamines, polyamides, polyureas, polyacrylates, polyolefins (polystyrene, polybutadiene, etc.), polyesters (thermally/UV curable), epoxy, etc., by utilizing various polymerization techniques such as polycondensation, anionic, cationic, ring-opening, free radical (ATRP, RAFT, NMP, etc.), ROMP, etc., and produced several invention disclosures for patent filing.
- Collaborated with engineering team to determine Li-ion conductivity and voltage stability of polymer films.
- Used advanced separation and characterization techniques such as Combiflash, GC-MS, GPC, TGA, DSC, etc., for purification and characterization of monomers, small molecule additives and polymers.
- Co-lead in inventory maintenance and acquisition of new instruments and their maintenance.

Research Scientist, Maxterial, Inc., Richmond, CA Jun 2017 - Aug 2017

- Worked on identifying and designing new organic small molecule additives to improve the quality and stability of metal protective coatings.
- Demonstrated the stability of Maxterial[®] coating on steel and carbon steel by electrodeposition and electroless deposition.

Graduate Research Assistant, Southern Illinois University, Carbondale, IL Aug 2012 - May 2017

- Developed an efficient method for the synthesis of cyclopenta-fused polycyclic aromatic hydrocarbons.
- Synthesized and characterized cyclopenta-fused polycyclic aromatic hydrocarbon based fully conjugated low-bandgap small molecules and polymers for semiconductor applications.
- Worked on surface modification of silicon substrates and thin film deposition of polymers/small molecules for semiconductor device fabrication and measurement.
- Utilized advanced material characterization techniques of small molecules and polymers including HPLC, GC, CV, DSC, TGA, GPC, NMR, UV-Vis spectrometry and Mass Spectrometry.
- Designed and synthesized novel anti-cancer derivatives of Niclosamide in collaboration with Dr. Knako Hayashi, Department of Physiology, SIU.
- Trained 4 undergraduate students and a high school student under NSF-REU program.
- 6 publications in high impact journals including J. Am. Chem. Soc. and Angew. Chem. Int. Ed.

Research Scholar, Indian Institute of Chemical Technology, Hyderabad, TS, India Jan 2009 - Jun 2012

- Developed novel synthetic methods for the preparation pyrrolo (1,2-a) pyrazine, pyrrolo (1,2-a) quinoxalines, benzothiazoles, n-aryl pyrroles and β -amino ketones.

Jr. Patent Analyst, Thomson Reuters, Hyderabad, TS, India July 2008 - Dec 2008

- Analyzed chemistry patents for original claims and inventions and coded them for Web of Science.

EDUCATION

Ph.D. in Organic Chemistry, Southern Illinois University, Carbondale, IL (GPA-3.74/4.0) 2012 - 2017
Advisor: Dr. Kyle N. Plunkett

Dissertation Title: Design, synthesis and characterization of π - conjugated small molecules and polymers by a palladium catalyzed cyclopentannulation strategy.

M.Sc. in Organic Chemistry, Osmania University, TS, India (GPA-3.7/4.0) 2006 - 2008

B.Sc. in Chemistry, Kakatiya University, TS, India (GPA-4.0/4.0) 2003 – 2006

SKILLS AND EXPERTISE

- Multistep small molecule synthesis
- Method development
- Polymer synthesis
- Air-free techniques
- Living free radical polymerization
- Glove box
- Schlenk line techniques
- UV-Visible spectroscopy
- Gel permeation chromatography
- Differential scanning calorimetry
- Thermogravimetric analysis
- Nuclear Magnetic Resonance spectroscopy
- Cyclic voltammetry
- IR spectroscopy
- Data analysis
- Scifinder
- Reaxys
- ChemDraw
- Microsoft office suite
- MestReNova
- Interpersonal skills

AWARDS AND FELLOWSHIPS

Midwest Graduate Research Award (ACS) 2016

- Invited research presentation and money (\$200) award for travel to the MWRM-2016 meeting

Div. of Organic Chemistry (ACS) Graduate Research Symposium 2016

Div. of Organic Chemistry (ACS) Travel Award 2016

- \$600 travel award to attend the ACS National Meeting and present my work.

Gower Summer Research Fellowship, SIU 2016

- Summer tuition and stipend pay along with \$1000 personal award for excellence in graduate research

Doctoral Graduate Fellowship, SIU 2016

- Full year tuition and stipend pay from graduate school for excellence in graduate studies

Graduate Professional Student Council (GPSC) Research Award, SIU 2015

C. David Schmulbach Graduate Teaching Award, SIU 2015

*Scifinder Future Leaders in Chemistry 2014

- One of the 18 members selected worldwide to attend the fully paid one-week program at CAS and successive ACS National Meeting along with \$1000 personal award.

CSIR Research Fellowship 2009 - 2012

PROFESSIONAL AFFILIATIONS

Vice President, Material Research Society University Chapter, SIU 2015 - 2017

Member, Material Research Society (MRS) 2015 - Present

Member, American Chemical Society (ACS) 2013 - Present

VOLUNTEER EXPERIENCE

Judge, Undergraduate Poster Presentations, CURCA-SIU 2016

Judge, Science Fair, Illinois Junior Academy of Science 2015

PUBLICATIONS

1. **Bheemireddy, S. R.**, Zhang, J., Agarwal, G., Shkrob, I., Zhang, L., “Fluorinated Dialkoxyarenes for All-Organic Redox Flow Batteries with High Cycle Life”, **Under preparation.**
2. **Bheemireddy, S. R.**, Yuyue, Z., Zhang, L., “Highly Soluble Non-Aqueous Redox-Anolyte for Redox Flow Batteries with High Stability”, **Under preparation.**
3. Zhao, Y., Yu, Z., Robertson, L. A., Zhang, J., Shi, Z., **Bheemireddy, S. R.**, Shkrob, I. A., Y Z, Li, T., Zhang, Z., Cheng, L., Zhang, L., “ Unexpected electrochemical behavior of an anolyte redoxmer in flow battery electrolytes: solvating cations help to fight against the thermodynamic-kinetic dilemma” *J. Mater. Chem. A*, **2020**, <https://doi.org/10.1039/D0TA02214D>.
4. **Bheemireddy, S. R.**, Hussain, W. A., Uddin, A., Du, Y., Hautzinger, M. P., Kevorkian, P., Petrie, F., and Plunkett, K. N., “Cyclopentannulation and Cyclodehydrogenation of Isomerically Pure Dibrominated Anthradithiophenes leading to Contorted Aromatics”, *Chem. Commun.*, **2018**, *54*, 14140-14143.

5. **Bheemireddy, S. R.**, Hautzinger M. P. and Plunkett, K. N., “Conjugated Ladder Polymers by a Palladium-Catalyzed Cyclopentannulation Polymerization”, *J. Am. Chem. Soc.*, **2017**, *139*, *16*, 5801–5807.
Highlighted in *Synfacts*, **2017**, *13*, 0695.
6. **Bheemireddy, S. R.**, Ubaldo, P.C., Finke, A.D., Wang, L., and Plunkett, K. N., “Contorted Aromatics via a Palladium-Catalyzed Cyclopentannulation Strategy”, *J. Mater. Chem. C*, **2016**, *4*, 3963-3969.
7. **Bheemireddy, S. R.** and Plunkett, K. N., “Dicyclopenta[cd,jk]pyrene Based Acceptors in Conjugated Polymers”, *Polym. Chem.*, **2016**, *7*, 292-296.
Highlighted in *Polymer Chemistry Editorial Board's Top Picks*.
8. Zhu, X., **Bheemireddy, S.R.**, Sambasivarao, S.V., Rose, P.W., Torres Guzman, R., Waltner, A.G., DuBay, K.H., and Plunkett, K.N., "Construction of Donor-Acceptor Polymers via Cyclopentannulation of Poly(arylene ethynylene)s", *Macromolecules*, **2016**, *49*, 127-133.
Highlighted in *Synfacts*, **2016**, *12*, 0250.
9. **Bheemireddy, S. R.**, Ubaldo, P.C., Rose, P.W., Finke, A.D., Zhuang, J., Wang, L. and Plunkett, K. N., “Stabilizing Pentacene By Cyclopentannulation”, *Angew. Chem. Int. Ed.* **2015**, *54*, 15762 –15766.

PRESENTATIONS

1. **Bheemireddy, S. R.**, Matthew P. Hautzinger and Plunkett, K. N., “Conjugated Ladder-Type Polymers by a Palladium Catalyzed Cyclopentannulation Approach”, *Midwest Regional Meeting- American Chemical Society*, **2016**, *Manhattan, KS*.
2. **Bheemireddy, S. R.**, Matthew P. Hautzinger, Aaron D. Finke and Plunkett, K. N., “Utilizing Palladium-Catalyzed Cyclopentannulations to Create Contorted Aromatics and Pentacene-Based CP-PAHs” *Division of Organic Chemistry Graduate research symposium-ACS*, **2016**, *Bryn Mawr College, Bryn Mawr, PA*.
3. **Bheemireddy, S. R.**, Matthew P. Hautzinger and Plunkett, K. N., “Highly Conjugated Ladder-Type Polymers by Palladium Catalyzed Cyclopentannulation and Post Polymer Modification”, *American Chemical Society*, **2016**, *Philadelphia, PA*.
4. **Bheemireddy, S. R.**, and Plunkett, K. N., “Utilizing Palladium Catalyzed Cyclopentannulations to Create Contorted Aromatics”, *American Chemical Society*, **2015**, *Boston, MA*.
5. **Bheemireddy, S. R.**, Ubaldo, P.C., Finke, A.D., Wang, L., and Plunkett, K. N., “Utilizing Palladium-Catalyzed Cyclopentannulations to Create Contorted Aromatics And Pentacene-Based CP-PAHs” Scifinder® Future Leaders in Chemistry program, CAS-ACS, **2015**, *Columbus, OH*.
6. **Bheemireddy, S. R.**, and Plunkett, K. N., “Utilizing Palladium Catalyzed Cyclopentannulations to Create Contorted Aromatics and Pentacene Based CP-PAHs”, *Cal Meyers Symposium*, **2015**, *Carbondale, IL*.
7. **Bheemireddy, S. R.** and Plunkett, K. N., “Synthesis of Dicyclopenta[cd,jk]pyrene Based Donor-Acceptor
8. Copolymers”, *American Chemical Society*, **2014**, *Dallas, TX*.
9. **Bheemireddy, S. R.** and Plunkett, K. N., “Cyclopenta-fused polycyclic aromatic hydrocarbons” *Scifinder® Future Leaders in Chemistry program, CAS-ACS*, **2014**, *Columbus, OH*.