**NOMINATION**

**OF**

**DR B V SUBBAREDDY,**

**CHAIR AND CHIEF SCIENTIST, FLUORO AGRO CHEMICALS DIVISION,**

**CSIR-INDIAN INSTITUTE OF CHEMICAL TECHNOLOGY , TARNAKA, HYDERABAD- 500007**

**FOR**

**THE SUN PHARMA RESEARCH AWARD 2021**

**IN**

**PHARMACEUTICAL SCIENCES**

**Brief Curriculum Vitae **

**1. Professional Details:**

**B V Subba Reddy**, PhD, Chief Scientist

Chair, Fluoro & Agrochemicals

CSIR-Indian Institute of Chemical Technology, Hyderabad-500007

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**2. Education Details:**

* PhD in Organic Chemistry @ CSIR-IICT.
* Post Doctoral Fellow @ Harvard University under Prof E. J. Corey (Nobel Laureate in Chemistry)
* AvH Fellow @ Max-Planck Institute, Germany.

**3**. **Academy Fellowships:**

* Fellow of National Academy of Sciences **2013** (FNASc)
* Fellow of Andhra Pradesh Academy of Sciences **2014**

**4. Awards and Honors:**

* Life time achievement award by A P Academy of Sciences **2018**
* Chemical Research Society of India (CRSI) Bronze Medal **2016**
* NASI-Reliance Industries Platinum Jubilee Award **2014**
* Alexander von Humboldt Fellowship **2010**
* CRSI Young Scientist for the year **2010**
* AVRA Young Scientist Award **2009**
* IICT Roll of Honor Award **2009** by IICT
* Scopus Young Scientist Award **2008** by Elsevier Science
* Best Performance Award for the Year **2007** for publishing highest number of research papers 52 with a total impact factor 124.5.
* Best Performance Award for the Year **2001** for publishing highest number of research papers 35 with a total impact factor 78.2; Average I F= 2.25
* Director's Special Award for the Year **2001** for oustanding effort in publishing highest number of research papers 24 with a total impact factor 50.4.
* Y. S. Raja Reddy GOLD MEDAL for the year **1995** by SKD University.

**5. Publications and Citations:**

* No of publications: **785**
* No of citations: **20,650**
* Sum of times cited without self-citations: **18,610**
* Average Citations without self-citations: **25.63**
* H-index: **64**
* Received **16th** most productive scientist (Chemical Sciences) in India for the years **1996-2006** (Current Science).
* Received **5th** rank in average citations per paper and **8th** rank in H-index.
* Received **60** Citations in Jerry March, 7th Edition, Text Book.
* Ranked among top 2% scientists in world by Stanford University (**2020**).

**6. PhD Students Supervised:**

* Ph.D Awarded– 42 Nos, M.Sc Dissertations – 25 Nos

**7. Industry Sponsored Projects by Colgate Palmolive Company:**

The following 16 sponsored projects from Colgate Palmolive Company have been completed and developed a novel natural product based anti-bacterial agent, isopropylmagnolol, for oral care products like mouth wash, tooth paste, shampoo etc to substitute triclosan.

1. Synthesis of Novel Classes of Color Changing Dyes Applicable in Personal Care Products that Provide Consumer Perceivable Sensory Cues as Efficacy Signals for Personal Care Products **(2007-08)**

2. Honokiol Synthesis **(2008-09)**

3. Conversion of 2kgs of Honokiol into Propyl Honokiol **(2009-10)**

4. Synthesis of Magnolol and Honokiol **(2009-10)**

5. Synthesis of Different Classes of Ester Quats and Study of their Hydrolytic Stability **(2009-10)**

6. Synthesis of Honokiol from 1,4-Cyclohexadione via Grignard Route and Up-scaling the Synthesis of Magnolol, Butyl Magnolol and Propyl Magnolol **(2009-2010)**

7. Synthesis of Dichloromagnolol from o-Chlorophenol **(2009-10)**

8. Assignment of Lab Scale Process for Synthesizing Magnolol (**Technology transferred)**\* **(2010-11)**

9. Synthesis of Magnolia Analogs **(2010-11)**

10 Synthesis of Propyl, Butyl, Isobutyl and Isobutyl Magnolols **(2010-11)**

11. Licensing the Process for Making Propyl Isomagnolol (**Technology transferred**)\* **(2011-12)**

12.Development of Novel Synthetic Route for Hinokitiol **(2011-12)**

13.Process Development for the Synthesis of Poly(allyl)guanidine (200 g)

**(2012-13)** for Gum care

14. Development of Novel Routes for Synthetic Shellac **(2014-2015)**

15. Process Development for the Synthesis of Hinokitiol (150 g) **(2015-2016)**

16. Process Development for the Synthesis of Honokiol (200 g) **(2015-2016)**

**8. Other industrial sponsored projects completed:**

1. Process optimization of ciclesonide, budesonide and fenoterol
2. Resolution of (±)-salbutamol using (+)-2,3-dibenzoyl-D-tartaric acid
3. (*R*,*S*)- and (*R*,*R*)-*cis*-cyclopenten-1,3-diols by enzymatic desymmetrization
4. Process development of *mono*-terpene derived perfumery chemicals.
5. Process improvement offluconazole, fexofenadine & sugammadex
6. Enzymatic reduction of *tert*-butyl (1-oxo-1-phenylhex-5-yn-2-yl)carbamate (akey intermediate for vibegron)
7. Process development of *L*-Methionine sulfoximine, glutamine synthetase inhibitor
8. Process development of 6-acetoxy-5-hexadecanolide, mosquito oviposition attractant
9. Process development of glufocinate, an alternate herbicide to glyphosate
10. Improvement of enantioselectivity in the synthesis of indoxacarb intermediate, (*S*)‐5‐chloro‐1‐oxo‐2,3‐dihydro‐2‐hydroxy‐1*H*‐indene‐2‐carboxylic acid methyl ester.
11. Process development of 2-phospho-L-ascorbic acid trisodium, supplement for stem cell culture.
12. Process development of Loxoprofen, an anti-inflammatory drug, through an enamine alkylation.

**9. Technology Transferred to Pharma Industry:**

1. Synthesis of magnolol and its analogue compounds (US8519197B2) technology transferred to **Colgate-Palmolive Company**
2. Processes for making magnolol derivatives (US9676690B2) tech transferred to **Colgate-Palmolive Company**
3. An antioxidant compound having anti-atherosclerotic effect and preparation thereof (US9580452B2) technology transferred to **Sun Pharmaceutical Industries Ltd**
4. Antioxidant compound having anti atherosclerotic effect and preparation thereof (US9963476B2) technology transferred to [**Sun Pharmaceutical Industries Ltd**](https://www.sunpharma.com/)
5. 2-Deoxy-2-Glucose (**2-DG**): Technology transferred to **10** **pharma industries**. Process demonstrated to **2** Pharma Industries.

**10.** **Process developed for APIs:**

* Synthesis of (*R*)-sitagliptinfor the treatment of type II diabetes, *ChemistrySelect* **2016,** 1**,** 5445.
* Syntheses ofsolifenacin to treat [overactive bladder](https://en.wikipedia.org/wiki/Overactive_bladder) and neurogenic detrusor over activity, *Synthesis* **2014**,46, 2794.
* Synthesis ofalmorexant,for the treatment of Insomnia,*Tetrahedron Lett.*, **2014,** 55, 3157-3159.
* Synthesis of (-)-dihydrotetrabenazine, a drug for the treatment of hyperkinetic movement disorders, *Tetrahedron Lett.* **2012,** 53, 6916-6918.
* Synthesis of sivelestat (an inhibitor of human [neutrophil elastase](https://en.wikipedia.org/wiki/Neutrophil_elastase)) by aromatic C-H activation, *Asian J. Org. Chem*. **2017**, 6, 1851 – 1856.
* Synthesis of (1*R*,4*S*)-4-hydroxycyclopent-2-en-1-yl acetate, a KSM for Corey Lactone, via Novozyme-435 catalyzed desymmetrization (*Tetrahedron*, **2018**,46**,** 6673-6679).
* Improved process for terbinafine, an anti-fungal agent.
* Novel process for the synthesis of levetiracetam to treat epilepsy.
* Enantioselective synthesis of tegoprazan, anti-ulcer drug.
* Highly efficient process for voxelotortotreat sickle cell disease.
* Practical approach for the synthesis of miglustat to treat type I Gaucher disease.

**11**. **APIs processes under development:**

* Non- infringing process of hyponatremia drug, tolvaptan
* Cost-effective process for the synthesis of eliglustat **(**Gaucher's disease)
* Process development of anti-cancer drug, staurosporine
* Novel process for the synthesis of vibegron (Overactive bladder)
* Process development of vortioxetine (anti-depressant)
* Asymmetric reduction of enaminoesters using Rh(II)/(*R*,*S*)-Josiphos for the process development of sitagliptin.
* Novel process development of tafamidisfor the treatment of heart disease
* Process development of bempedoic acid for the treatment of hypercholesterolemia
* Novel synthesis of noscapine, an antitussive agent (cough-suppressing)
* Process development of apremilast to treat psoriatic arthritis.

**12. Process Development of Agrochemicals and their KSMs:**

* Improvement of *cis*-selectivity in the synthesis of methyl *cis*-4-methoxy-cyclohexanc-1-aminocarboxylate hydrochloride, a key intermediate of spirotetramat, an insecticide
* Novel process for cyazofamid, a fungicide
* Process development of glufocinate, an alternate herbicide to glyphosate
* Process development of chlorantraniliprole, an insecticide
* Process development of valifenalate, a fungicide
* Process development of dimethachlor, a herbicide
* Process development of saflufenacil (herbicide)

**13. Process Development of Pheromones for Crop Protection**

* Process development of 6-acetoxy-5-hexadecanolide the mosquito oviposition attractant
* Process development of (+)-grandisol used to control cotton boll weevil.
* Synthesis of (*S)*-2-hydroxy-3-decanone, Coffee White Stem Borer

[*Xylotrechus Quadripes*]

**14. Societal Contributions:**

Pheromone technology was successfully implemented to manage the pest in different crops over 3 lakhs acres in Telangana and Andhra Pradesh.

* During the Kharif season 2018, Pink Bollworm (PBW) pest infestation was controlled over 25000 acres in cotton fields in Telangana region using pheromone lures/traps by monitoring and mass-trapping of pest.
* During the Kharif season 2019, Fall Armyworm (FAW) was successfully controlled in Maize and Corn over 42440 acres in 120 mandals of 28 districts of Telangana by pest monitoring and mass-trapping.
* During the Kharif season 2019, Pink Bollworm (PBW) infestation was minimized in Andhra Pradesh through pest monitoring in 62400 Hectares (156000 Acres) over 9 districts.
* During the Rabi season 2020, pheromone technology was successfully implemented in Andhra Pradesh for pest monitoring in Rice (YSB) over 43,781 acres and Maize (FAW) over 15,875 acres in 13 districts under Dr YSR Polambadi program.
* During the Kharif season 2020, pheromone technology has successfully implemented over 25,000 acres in cotton fields of three aspirational districts of Telangana under CSIR Harit program.
* Implementation of pheromone technology for early detection of the pest in cotton by Wadhwani AI in six districts of Telangana in the Kharif season 2021.

**15. Technology Transferred to Agro-Industry**:

* Demonstration of synthetic process to **Nova Agritech Ltd**, in 25g scale

for the following pheromones:

a. *Bactrocera cucurbitae* (Melon fly)

b. *Leucinodes orbonalis*  (Brinjal shoot borer)

c. *Pectinophora gossypiella* (Pink boll worm)

d. *Scirpophaga incertulas* (Yellow stem borer)

* Process development of profenofos to PMFAI,
* 3) Process development of sodium TCP to AIMCO Pesticides,
* 4) Process development of cyazofamid to Insecticide India, Limited.

**16. List of Review Articles:**

1. “Multi-component reactions using Indium(III) salts”, *Current Organic Chemistry*, **2010**, Vol. 14, pp.414-424.
2. “Recent developments on Indium metal and its salts in organic synthesis”, *Eur. J. Org. Chem*. **2010**, pp. 591-605.
3. Recent Advances in the Applications of Ionic Liquids for the synthesis of bioactive six-membered *N*-heterocycles, *Current Organic Synthesis* **2011**, 787.
4. Recent advances in green techniques of halogenation reactions in Organic Synthesis, *Current Organic Synthesis* **2010**.
5. Recent progress in transition metal catalyzed hydrofunctionalization of less activated olefins, *J. Organomet. Chem.*, **2011**, pp.16-36.
6. Recent advances in Prins spirocyclization, *Eur. J. Org. Chem*. **2017**, pp. 5484
7. Aza-Prins reaction in the synthesis of natural products and analogues, *Eur. J. Org. Chem*. **2017**, pp. 1805.
8. Substrate-directed C-H functionalization of 2-aryl pyridines by transition metal complexes, *ChemistrySelect* **2018**, **3**, 47
9. Recent advances in intramolecular metal-free oxidative C–H bond aminations using hypervalent iodine(III) reagents, *Eur. J. Org. Chem*. **2019**, 1687.
10. Tandem Prins cyclizations for the construction of oxygen containing heterocycles, *Organic* & *Biomol. Chem.*, **2020,** **18**, 7514-7532.
11. Recent advances in C–H functionalization of quinazolinones/quinazolines *Current Organic Chemistry*, **2020**, **25**, 601 - 634.
12. Synthetic approaches to FDA approved drugs for asthma and COPD from

1969 to 2020. *Bioorg. Med. Chem*. **2021**, **41**, 116212.

**17. List of Books/Book Chapters:**

1. “Sulfamic Acid” in book entitled “*Electronic Encyclopedia of**Reagents for Organic**Synthesis*” published in **2007**.
2. “Indium catalyzed synthesis of heterocycles via cycloadditions” Chap 10, Vol 13, pp 99-171, in book entitled “[*Topics in Heterocyclic Chemistry*](https://commerce.metapress.com/content/120013/?p=a48260fab8d64eb88c8f5e4018053f9c&pi=0)” **2008**, Springer Berlin/Heidelberg.
3. “Organic synthesis using Bismuth” in book entitled “*Topics in Current Chemistry*" **2012**, *311*, 229.
4. Biosynthesis of silver nanoparticles, characterization and their antimicrobial activity, Chap 7, Vol 1, **2012**, in book entitled “*Nanomedicine and Drug Delivery*”Apple Academic Press, Inc, USA.
5. Polysaccharides as functional scaffolds for noble metal nanoparticles and their catalytic applications, in book entitled "*Encyclopedia of Nanoscience and Nanotechnology*" **2016**.
6. Ionic liquids/water binary mixtures mediated organic reactions, Springer Nature Singapore Pte Ltd. **2019.** Encyclopedia of ionic liquids (https://doi.org/10.1007/978-981-10-6739-6\_87-1).

**18. Top 12 Publications: (Annexure II)**

1. Enantioselective Fluorination of 3-Indolinone-2-carboxylates with NFSI Catalyzed by Chiral Bisoxazolines, S. Banik, T. Sahoo, B. Sridhar, **B. V. Subba Reddy,** *Organic Biomolecular Chemistry,* **2021**,19, 6085.
2. Tandem Prins cyclization for the synthesis of indole fused spiro-1,4-diazocane scaffolds, R. Chandrashekhar, B. Sridhar and**B. V. Subba Reddy,** *Organic & Biomolecular Chemistry***, 2020,** *18*, 7224-7224
3. Rh(III)-catalyzed tandem bicyclization of 2‑arylimidazo[1,2‑*a* ]pyridines with cyclic enones for the construction of bridged scaﬀolds. K. Nagarjuna Reddy, D. Yogananda Chary, B. Sridhar, and **B. V. Subba Reddy**, *Organic Lett*ers, **2019**, *21*, 8548- 8552.

# Asymmetric Robinson annulation of 3-indolinone-2-carboxylates with cyclohexenone: Access to chiral bridged tricyclic hydrocarbazoles, Suresh Yarlagadda, G. S. Sankaram, B. Sridhar, B. V. Subba Reddy, *Organic Letters*, 2018, *20*, 4195−4199.

# Oxidative asymmetric aza‐Friedel–Crafts alkylation of indoles with 3‐indolinone‐2‐carboxylates catalyzed by a BINOL phosphoric acid and promoted by DDQ, Suresh Yarlagadda, B. Sridhar, B. V. Subba Reddy, *Chemistry-An Asian Journal,* 2018, *13*, 1327–1334.

# Tandem Prins-type cyclization for the stereoselective construction of fused polycyclic ring systems, B. Someswarao, P. Rasvan Khan, B. Jagan Mohan Reddy, B. Sridhar, B. V. Subba Reddy, *Organic Chemistry Frontiers*, 2018, *5*,1320–1324.

1. Metal‐free one‐pot synthesis of 1,2,4‐triazolo[4,3‐*a*]pyridines from 2‐hydrazinylpyridines, L. Madhava Reddy, V. Veerabadra Reddy, P. Sai Prathima, Ch. Krishna Reddy, **B. V. Subba Reddy**, *Advanced Synthesis & Catalalysis* **2018**, 360, 3069–3073.
2. Organocatalytic enantioselective amination of 2-substituted indolin-3-ones: A strategy for the synthesis of chiral α-hydrazino esters, Suresh Yarlagadda, B. Ramesh, C. Ravikumar Reddy, L. Srinivas, B. Sridhar, **B. V. Subba Reddy**, *Organic Lett*ers, **2017**, *19*, 170-173.
3. Substrate directed C–H activation for the synthesis of benzo[*c*]cinnolines through a sequential C–C and C–N bond formation**, B. V. Subba Reddy**, C. Ravikumar Reddy, M. Rajashekhar Reddy, Suresh Yarlagadda, B. Sridhar, *Organic Lett*ers, **2015**, *17*, 3730−3733.
4. [Stereoselective synthesis of spiro[tetrahydropyran-3,3′-oxindole] derivatives employing Prins cascade strategy](https://pubs.acs.org/doi/abs/10.1021/ol503089m), **B. V. Subba Reddy**, V. Swathi, Manisha Swain, Manika Pal Bhadra, B. Sridhar, D. Satyanarayana, B. Jagadeesh, *Organic Letters,* **2014**, *16*, 6267−6269.
5. [Dual behaviour of isatin-based cyclic ketimines with dicarbomethoxycarbene: Expedient synthesis of highly functionalized spirooxindolyl oxazolidines and pyrrolines](https://pubs.acs.org/doi/abs/10.1021/ol400287q), T. Rajasekaran, G. Karthik, B. Sridhar, **B. V. Subba Reddy**, *Organic Letters,* 2013, *15*, 1512-1515.
6. [Cu(OTf)2-catalyzed synthesis of 2,3-disubstituted indoles and 2,4,5-trisubstituted pyrroles from α-diazoketones](https://pubs.acs.org/doi/abs/10.1021/ol303206w), **B. V. Subba Reddy**, M. Ramana Reddy, Y. Gopal Rao, B. Sridhar, *Organic Letters* 2013, *15*, 464-467.

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**Consent for Nomination**

28th October 2021

# [http://thumbp1.mail.re2.yahoo.com/tn?sid=706032261&mid=APAlvs4AAErbSPdWtwCPBh%2BrxRo&partid=3&f=541&fid=Inbox](http://us.mg2.mail.yahoo.com/ya/download?fid=Inbox&mid=1_1804118_APAlvs4AAErbSPdWtwCPBh+rxRo&pid=3&tnef=&YY=1224206016312&newid=1&clean=0&inline=1)I am herewith submitting the duly filled nomination form for the Sun Pharma Research Awards 2021 in pharmaceutical sciences for sponsoring my nomination. The research work presented in the nomination form is original and carried out by our students. I do hereby give my consent for sponsoring my nomination.

(B. V. Subba Reddy)

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Head, Fluoro Agrochemicals,

IICT, Hyderabad 500 007.

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**(c) Statement of research achievements (Annexure III)**

1. Dr B V Subba Reddy has been working with Colgate-Pamolive Company for the last eight years. Initially, he has developed novel fluorescein dyes for liquid aquarium soap formulations. Subsequently, he was involved in the development of novel anti-bacterial agents based on Natural Products such as Honokiol, Magnolol and Hinokitiol, for use in tooth paste, mouth wash, hair care and skin care products. The technologies developed by him have been transferred to industry for commercialization. He has developed an industrially viable synthesis of Poly(allyl)guanidine, which is used for Gum tissue grafting surgery. He is also involved in the development of synthetic route for natural shellac, which is being used for nail polish, wood polish and drug delivery. Recently, he is involved in the process development of Asthma drugs such as Salbutamol, Ciclesonide, Fenoterol, Fluticasone, Salmeterol, Vilaneterol, Indecaterol and Clobetasol for Vamsi Labs Ltd. He has also developed the process for both (*R*,*S*)- and (*R*,*R*)-cyclopenten-1,3-diols for Dev Synthesis, Hyderabad. They are chiral precursors for Prostaglandins such as Prostacyclin, Pentenomycin, PGE2, PGF2α, PGD1, PGE1, Terrein and for drugs like Ticagrelor, Noraristeromycin etc. He has been involved in the development of novel synthetic routes for different drugs such as Solifenacin, Almorexant, Dihydrotetrabenazine, Sitagliptin, Ramatroban, Dapoxetine and Rivastigmine etc. Apart from industrial contributions, he has been actively working on Asymmetric synthesis using Transition metal catalysis and Organocatalysis. For the purpose of drug discovery, he has developed tandem Prins-type cyclizations and metal catalyzed cycloaddition reactions of α-diazocarbonyl compounds to generate combinatorial libraries for biological screening. In the area of asymmetric synthesis, he was primarily involved in the design, synthesis and application of sugar based chiral ligands such as *bis*-oxazolines (developed as alternatives to D-amino acid derived *bis*-oxazolines) for the enantioselective C-C bond formation reactions such as Mukaiyama Michael reaction (*Advanced Synthesis & Catalysis*, **2013**, *355*, 383), Friedel-Crafts alkylation(*Org. Biomol. Chem.* **2012**, *10*, 4731). Recently, he has reported for the first time an organocatalytic (quinine-squaramide) enantioselective addition of diphenyl phosphite to ketimines derived from isatins for the synthesis ofchiral α-aminophosphonates (*Org. Biomol. Chem.* **2014**, *12*, 1595)*.* He is the first to develop sugar based chiral thiourea catalysts for the enantioselective Michael addition reactions (*RSC Advances* **2013**, *3*, 930; *RSC Advances* **2013**, *3*, 8756; *RSC Advances* **2014**, *4*, 9107; *RSC Advances* **2014**, *4*, 42299). Besides asymmetric catalysis, he has developed a new concept of tandem cyclization of oxo-carbenium ion generated from aldehyde and a homoallylic alcohol tethered with a nucleophile. He is the first to develop 'tandem Prins-type cyclizations' such as Prins/Friedel-Crafts cyclization (J. Org. Chem. **2011**, 76, 7677; *Eur. J. Org. Chem*. **2013**, 1993; J. Org. Chem. **2013**, *78*, 8161; *Asian J. Org. Chem.,* **2015**, DOI: 10.1002/ajoc.201500218), Prins/bicyclization (*Org. Biomol. Chem.* **2012**, *10*, 6562; J. Org. Chem. **2012**, *77*, 11355; J. Org. Chem. **2013**, 78, 6303; *Org. Biomol. Chem.* **2012**, *10*, 1349; *Org. Biomol. Chem.* **2014**, *12*, 4754; J. Org. Chem. **2014**, 79, 2716; *Eur. J. Org. Chem.* **2015**, 3103; ***Org. Biomol. Chem.****,* **2015**, *13*, 4733; ***Org. Biomol. Chem.***, **2015**, *13,* 6737), Prins/ene cyclization (*Org. Biomol. Chem.* **2015**, *13*, 2669; *Eur. J. Org. Chem*. **2015**, 3706), Prins/pinacol reaction (*Org. Biomol. Chem.* **2014**, *12*, 7257; *Org. Biomol. Chem.* **2015**, *13*, 8729), Prins/Wagner/Ritter reaction (*Org. Biomol. Chem.* **2015**, *13*, 5532) and Prins/spirocyclization (*Organic Lett.* **2014**, *16*, 6267; *Eur. J. Org. Chem*. **2014**, 4234; *RSC Advances*, **2014**, 16739; J. Org. Chem. **2014**, 79, 2289; J. Org. Chem. **2015**, 80, 653) using homoallylic substrates with tethered nucleophiles. In addition to tandem cyclizations, he has been working on transition metal catalyzed cycloaddition reactions of diazocarbonyl compounds for the synthesis of highly substituted pyrroles and indoles (*Organic Letters* **2013**, *15*, 464) and for the synthesis of spirooxindolyl oxazolidines/pyrrolines (*Organic Letters* **2013**, *15*, 1512), dispirooxindoles (*Eur. J. Org. Chem.* **2015**, 2038), spirooxindolyl furocoumarins (*Tetrahedron* **2014**, 70, 8148) and oxindole derived α-alkoxy-β-amino acids (*Eur. J. Org. Chem.* **2014**. 2221). He has also been working on gold catalysis to generatethe spirooxindole (*Eur. J. Org. Chem.,* **2014**, 3313), and andem Prins-type cyclization for the stereoselective construction of fused polycyclic ring systems *Organic Chemistry Frontiers*, **2018**, *5*,1320–1324. Recently, he has reported enantiselective amination, aza-Friedel-Crfats reaction, and domino Robinson annulation reactions (*Org. Lett*. **2017**, 19, 170−173; *Chemistry-An Asian Journal****,* 2018,** *13***,** 1327–1334and*Org.Lett*. **2018**, 20, 4195−4199). More recently, he has also reported metal‐free one‐pot synthesis of 1,2,4‐triazolo[4,3‐*a*]pyridines from 2‐hydrazinylpyridines *Advanced Synthesis &* Catalalysis **2018**, 360, 3069–3073. Rh(III)-catalyzed tandem bicyclization of 2‑arylimidazo[1,2‑*a* ]pyridines with cyclic enones for the construction of bridged scaﬀolds, *Organic Lett*ers, **2019**, *21*, 8548- 8552. Tandem Prins cyclization for the synthesis of indole fused spiro-1,4-diazocane scaffolds, *Organic & Biomolecular Chemistry***, 2020,** *18*, 7224-7224. Enantioselective Fluorination of 3-Indolinone-2-carboxylates with NFSI Catalyzed by Chiral Bisoxazolines, *Organic Biomolecular Chemistry,* **2021**,19, 6085.

(d) **Details of the research work duly signed by the applicant, for which the Sun Pharma Science Foundation Research Award is claimed, including references and illustrations (not to exceed 6000 words).**

Dr. Subba Reddy, an upcoming and bright young organic chemist, has made significant contributions in the field of organic synthesis. His areas of interests include asymmetric synthesis of biologically active compounds in enantiopure form, development of novel cascade cyclizations and cycloaddition reactions of carbonyl ylides & azomethine ylides derived from α-diazocarbonyl compounds. He has contributed majorly in the field of tandem cyclizations of oxo-carbenium ions derived from aldehydes and nucleophile tethered homoallylic alcohols to generate the fused/bridged bicyclics and spiro-tetrahydropyran scaffolds. His work on intramolecular Prins cyclization is highly remarkable to generate combinatorial libraries through diversity oriented synthesis. He was also involved in the total synthesis of complex natural products that are useful for the treatment of cancer (Xyolide, Cleistenolide, Attenol A, Phomolide, Anamarine, Deoxoprosophylline, Penaresidin A, Hapalosin & Luotonin A) and TB (Tryptanthrin & Phaitanthrin, Rutaecarpine), which shows his sustainability in taking up long term projects and concern for human health. Utilization of carbohydrates to the preparation of biologically active natural products is well appreciated. Transition metal catalyzed cycloaddition reactions of α-diazocarbonyl compounds for the synthesis of spirocycles are outstanding. He has extensively explored the microwave technology as an alternative heating source for the rapid synthesis of a large number of organic molecules for drug discovery. He has successfully performed metal catalyzed transformations and multi-component reactions using ionic liquids as recyclable solvents. Recent achievements of nominee include the development of novel haloamide cyclizations for the stereoselective synthesis of tetrahydroquinoline and tetrahydro-β-carboline alkaloids and drugs like sitagliptin, solifenacin, almorexant and dihydrotetrabenazine using Ellman's chiral auxiliary. In addition to basic research, he was simultaneously involved on industry (Colgate Palmolive, Adama, UPL) sponsored projects and developed novel process technologies. Currently, he is actively involved as a project co-coordinator in CSIR Agro-mission for the process development of four insecticides, four fungicides and four herbicides. He is promoting green strategies in the crop protection by implementing pheromone technology to minimize pests in major crops like cotton, maize, corn, rice, black gram, red gram, green gram, sun flower, ground nut, fruits and vegetables.

**Evaluation of the impact on national prosperity of this work and economic gains and other benefits derived**:

* In recent years, Dr Reddy has been working on insect sex pheromones to control pests in different crops like cotton, rice, groundnut, sugarcane and vegetables/fruits. Pheromone technology was successfully implemented to manage the pest in different crops over 3 lakhs acres in Telangana and Andhra Pradesh. He has successfully transferred the Pheromone lure technology to M/s Nova Agri Tech Pvt Ltd, Hyderabad to protect the cotton from Pink Boll Worm (PBW), which is major devastating pest in cotton. He has also been working with various NGOs to promote organic farming in the country. In addition, his group has also supplied 3 lakhs PBW lures to Gujarat state through UPL, industries. Very recently, our group has successfully implemented pheromone technology for the protection of rice and maize in Andhra Pradesh under YSR Polambadi program. On the occasion of CSIR Foundation Day, our department has conducted farmers meet with more than 300 farmers participation on Sep 26,2016 for the propagation and implementation of Pheromone Technology.
* Brought a few start-ups like Virupaksha Life Sciences, Vishnu Pharma (P) Limited, Chandravardhan Organics, Russell IPM, ATGC Biotech and ZunaChem to CSIR-IICT in the area of pharma and agrochemicals
* Provided training on pheromone formulations to more than twenty start-ups to establish companies in the area of pheromones.
* Successfully completed bench scale processes of 12 agromolecules under CSIR Agromission as a project coordinator and a few of them are under negotiation for transfer to Industries.
* Under this agromission, a pilot plant facility has been established for the scale up synthesis of agrochemicals.
* This pilot plant facility is build with 20L to 160L reactors with glass, stainless steel and hastelloy and also established a distillation setup with 20 L glass and stainless steel reactors.
* To strengthen the pheromone research at CSIR-IICT, actively involved in CSIR cotton mission to control pink bollworm, which is most obnoxious pest in cotton. As the Chair of the department, he has collaborated with many agro and pharma industries and brought new clients to CSIR-IICT. A few of them are listed below: Vamshi Labs, Virupaksha Organics, Enol Drugs, Dev Synthesis, Molecraft Life Sciences, ATGC Biotech, Adama India (P) Limited and Srujana Biopharma.
* Recently, he has developed 2-Deoxy-D-Glucose (to maintain the oxygen saturation levels in COVID-19 patients) and transferred to more than 10 pharma industries.

**Justification for Nomination**

It gives me a great pleasure and pride in nominating Dr. B V Subba Reddy, an excellent organic chemist with outstanding performance, who is an extensively working in the area of asymmetric synthesis, natural products synthesis, carbohydrate chemistry and utilizing his expertise and skills in human health care through drug discovery and pharmaceutical research, for this award. I strongly consider him to be the most deserving candidate for the award and wish him for success.

Dr. Reddy has 20 years of research experience in organic synthesis. The nominee has exceptional contributions in the field of organic chemistry with a special emphasis on medicinal chemistry employing tandem cyclizations, asymmetric synthesis and multi-component reactions. He has been working in collaboration with Colgate-Pamolive Company for the last eight years. Initially, he has developed novel fluorescein dyes for liquid aquarium soap formulations. Subsequently, he was involved in the development of novel anti-bacterial agents based on Natural Products such as Honokiol, Magnolol and Hinokitiol, for use in tooth paste, mouth wash, hair care and skin care products. The technologies developed by him have been transferred to industry for commercialization. He made more potent analog of magnolol for use in tooth paste as an anti-baterial agent, which is more potent than currently used triclosan. He has developed an industrially viable process for poly(allyl)guanidine, which is used for Gum tissue grafting surgery. He is also involved in the development of synthetic route for natural shellac, which is being used for nail polish, wood polish and drug delivery. Recently, he is involved in the process development of Asthma drugs such as Ciclesonide, Fenoterol, Fluticasone, Salmeterol, Vilaneterol, Indecaterol and Clobetasol for Vamsi Labs Ltd. He has developed a concise and cost effective process for both racemic and chiral Salbutamol, which is being used for Asthma. This project was sponsored by GPR Life Sciences Pvt Ltd, Bidar. He has also developed the process for both (*R*,*S*)- and (*R*,*R*)-cyclopenten-1,3-diols, which are chiral precursors for Prostaglandins such as Prostacyclin, Pentenomycin, PGE2, PGF2α, PGD1, PGE1, Terrein and for drugs like Ticagrelor, Noraristeromycin etc. This work was sponsored by Dev Synthesis, Hyderabad. He has been involved in the development of novel synthetic routes for different drugs such as Solifenacin, Almorexant, Dihydrotetrabenazine, Sitagliptin, Ramatroban, Dapoxetine and Rivastigmine etc.

Apart from industrial contributions, he is the first to develop tandem Prins cyclizations such as Prins/bicyclization, Prins/Friedel-Crafts cyclization and Prins spirocyclization to construct a wide range of highly functionalized tetrahydropyran scaffolds, which are key components of many biologically active molecules. In addition, he has also been involved in asymmetric synthesis using organocatalysis and transition metal catalysis. He is the first to develop a bifunctional rosin-derived indane amine thiourea and sugar-cinchona thiourea organocatalysts for enantioselective Michael reactions of β-nitrostyrenes and β,γ-unsaturated α-ketoesters and also quinine-squaramide for theenantioselectiveaddition ofdiphenylphosphite to isatin imines; and sugar based *bis*-oxazolines for the nitro-Aldol reaction, Friedel-Crafts alkylation of indoles, Mukaiyama-Michael addition of silyl enol ethers. He has also made significant contributions in the area of diazo chemistry to produce a novel class of spirocycles.

Dr. Reddy proved his efficiency by producing the results of great impact, which is reflected from his publications in high quality journals with top citations and the international patents. His work is well cited in journals of high repute and reviews with good frequency. The research interests of Dr. Reddy in the field of Synthetic Organic Chemistry are directly related to the Human Health Care. As a leader, he inspired a team of young researchers and demonstrated the skills in managing to show excellence both in academic and sponsored research. He is an instrumental in developing novel ‘green’ methods with easily available Lewis acids. His synthetic methods, especially multi-component reactions under solvent free conditions, utilized for the synthesis of NCEs, is an exceptional contribution.

He is very successful in developing new technologies for novel anti-bacterial agents. The technology developed by him has been transferred to industry for commercialization. He is instrumental in generating ECF about 6,70,000USD to the institute. He has made outstanding contributions to academic as well as to industry. To his credit, he has published more than 785 papers with an average citations per paper of 25.63 and h-index of 64. I am herewith enclosing the nomination in prescribed proforma along with supporting documents.

Thanking You,

Yours Sincerely

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Dr. J. S. Yadav, FNA, FTWAS,

Former Director and Bhatnagar Fellow CSIR-

IICT, Hyderabad, Provost, Chancellor, Indrashil University

**Technologies Transferred to Industry**









**Contributions in drug discovery and development**



**EJOC, 2015, 8018; EJMC, 2014, 84, 118**



**BMCL, 2015, 25, 3867-72**;









