Faculty Details

Name: Dr. Santosh Kumar Padhi

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Area Of Research:Biocatalysis, Protein engineering, Green Chemistry, Enzymes for asymmetric synthesis, Engineering enzymes for synthesis of pharmaceutical intermediates and industrial applications. Visit to Lab website for more details: https://biocatalysishcu.wixsite.com/skplab

https://biocatalysishcu.wixsite.com/skplab

Faculty Details

Biocatalysis and Enzyme Engineering Laboratory

Education

Ph. D. 2005, Bioorganic Chemistry, Indian Institute of Technology, Madras, India. Mentor: Prof. Anju Chadha. M. Sc. 1999, Organic Chemistry, Berhampur University, Odisha, India. ,

Professional experience

Jan’24-Present, Associate Professor, Department of Biochemistry, School of Life Sciences, University of Hyderabad, Hyderabad, India.

Jan’15-Jan’24, Assistant Professor, Department of Biochemistry, School of Life Sciences, University of Hyderabad, Hyderabad, India. Jan’12-Jan 15, Assistant Professor, Department of Biological Sciences, BITS Pilani, Rajasthan, India.

Jan’10-Dec' 11, Postdoctoral Associate, Department of Biotechnology & Enzyme catalysis, Ernst-Moritz-Arndt University, Greifswald, Germany, Mentor: Prof. Uwe T. Bornscheuer.

July'07-Aug'09, Postdoctoral Associate, Department of Biochemistry, Molecular Biology and Biophysics, Biotechnology Institute, University of Minnesota, St. Paul, USA, Mentor: Prof. Romas J. Kazlauskas.

Aug'05-July'07, Postdoctoral Associate, Biochemistry Division, Department of Chemistry, University of Florida, Gainesville, USA, Mentor: Prof. Jon D. Stewart.

Accolades

Alexander von Humboldt (AvH) Foundation, Germany Renewed Research Fellowship June 2023 to August 2023. "Outstanding Reviewer for Catalysis, Science and Technology in 2018" recognized by Catalysis, Science and Technology, Royal Society of Chemistry.
Alexander von Humboldt (AvH) Foundation, Germany Renewed Research Fellowship May 2018 to July 2018. Outstanding Potential for Excellence in Research and Academics (OPERA) award by BITS Pilani, Rajasthan, -December 2014
Alexander von Humboldt (AvH) Research Fellowship, Germany, 2010-2011.
First rank in M.Sc, Berhampur University, Odisha, India.

Notice Board

No Records Available

Students And Project Trainees

Students/Projects Trainees

Name	Joined As	Mail	Contact
Ragini Payyavula	PhD Student	23lbph01@uohyd.ac.in	04066794622
Ayon Chatterjee	PhD student	ayonchatterjee1994@gmail.com	04066794622
Ghufrana Abdus Sami	PhD student	ghufranaasami@gmail.com	04066794622
Mohit Rajoria	PhD student	mohitrajoria259@gmail.com	04066794622
Sukadev Rana	PhD student	21lbph08@uohyd.ac.in	04066794622
Tota Vinay Kumar	PhD student	thotavinaykumar08@gmail.com	04066794622

Former Students/Projects Trainees

Name	Joined As	Working
D H.Sreenivasa Rao	PhD student	School of Engineering, Lancaster University, Lancaster LA1 4YW, United Kingdom
Badipatla Vishnu Priya	PhD student	
Nisha Jangir	PhD student	Research Associate, University of North Carolina, USA
Shalini Mishra	Project Assistant	
Uha Puchakayala Akola	Project assistant	

Publications

31 Anju Chadha,* Santosh Kumar Padhi,* Selvaraj Stella,* Sowmyalakshmi Venkataraman* (2024) , Microbial Alcohol Dehydrogenases: Recent Developments and Applications in Asymmetric Synthesis , Org. Biomol. Chem., Royal Society of Chemistry,22,,228-251.

30 Sukadev Rana, Ayon Chatterjee, and Santosh Kumar Padhi (2024) , A single enzyme in enantiocomplementary synthesis of beta-nitroalcohols: Bidirectional catalysis by hydroxynitrile lyase , ChemBioChem, Wiley,,,.

29 Ayon Chaterjee, G. Priyanka, N. Prakash Prabhu, and Santosh Kumar Padhi (2024) , Diastereoselective Nitroaldolase Activity Towards Highly Stereocontrolled Synthesis of anti beta-Nitroalcohols , ACS Catalysis, American Chemical Society,14,,12623-12634.

28 Umate Nachiket Shankar, Mohit, Santosh Kumar Padhi, Mohd. Akif (2023) , Biochemical characterization, substrate and stereoselectivity of an outer surface putative alpha/beta hydrolase from the pathogenic Leptospira , International Journal of Biological Macromolecules, Elsevier,229,,803-813.

27 Badipatla Vishnu Priya, D. H. Sreenivasa Rao, Ayon Chatterjee, Santosh Kumar Padhi (2023) , Hydroxynitrile lyase engineering for promiscuous asymmetric Henry reaction with enhanced conversion, enantioselectivity and catalytic efficiency , Chem. Commun., Royal Society of Chemistry,59,,12274-12277.

26 Badipatla Vishnu Priya, Santosh Kumar Padhi (2023) , Hydroxynitrile lyase discovery, engineering and promiscuity towards asymmetric synthesis: Recent progress , Eur. J. Org. Chem., Wiley,26,48,e202300776.

25 Priya B V, Rao DH Sreenivasa., Gilani R, Lata S, Rai N, Akif M, Padhi Santosh Kumar (2022) , Enzyme engineering improves catalytic efficiency and enantioselectivity of hydroxynitrile lyase for promiscuous retro-nitroaldolase activity , Bioorganic Chemistry, Elsevier,120,,105594.

24 Rao DH Sreenivasa., Shivani Kummari, Padhi Santosh Kumar (2021) , Immobilized Arabidopsis thaliana hydroxynitrile lyase catalyzed retro-Henry reaction in the synthesis of (S)-beta nitroalcohols , Appl. Biochem. Biotechnol., Springer,193,,560-576.

23 Rao DH sreenivasa, Chatterjee Ayon, Padhi Santosh Kumar (2021) , Biocatalytic approaches for enantio and diastereoselective synthesis of chiral beta-nitroalcohols , Org. Biomol. Chem., Royal Society of Chemistry,19,,322-337.

22 Chatterjee Ayon, Rao DH sreenivasa, Padhi Santosh Kumar (2021) , One-pot enzyme cascade catalyzed asymmetrization of primary alcohols: Synthesis of enantiocomplementary chiral beta-nitroalcohols , Advanced Synthesis Catalysis, Wiley,363,,5310-5318.

21 Jangir, Nisha., Preeti., Padhi, Santosh Kumar., (2020) , A study on increasing enzymatic stability and activity of Baliospermum montanum hydroxynitrile lyase in biocatalysis , Process Biochemistry, Elsevier,88,,78-89.

20 Aslan-U, Askin, S., Beier, Andy., Kovar, David., Cziegler, Clemens., Padhi, Santosh Kumar, Dorr, Mark., Bottcher, Dominique., Hollmann, Frank., Rudroff, Florian., Mihovilovic, Marko D., Buryska, Tomas., Damborsky, Jiri., Prokop, Zbynek., Badenhorst, Christoffel P. S., Bornscheuer, Uwe T. (2020) , An ultrasensitive fluorescence assay for detection of halides and enzymatic dehalogenation , ChemCatChem, Wiley,12,,2032-2039.

19 Rao DH Sreenivasa., Padhi Santosh Kumar. (2019) , Production of (S)-β-Nitro Alcohols by Enantioselective C− C Bond Cleavage with an R-Selective Hydroxynitrile Lyase , ChemBioChem, Wiley,20,3,371-378.

18 Jangir, Nisha., Padhi, Santosh Kumar., (2019) , Immobilized Baliospermum montanum hydroxynitrile lyase catalyzed synthesis of chiral cyanohydrins , Bioorganic chemistry, Academic Press,84,,32-40.

17 Jangir, Nisha., Sangoji, Dheeraj., Padhi, Santosh Kumar., (2018) , Baliospermum montanum hydroxynitrile lyase catalyzed synthesis of chiral cyanohydrins in a biphasic solvent , Biocatalysis and agricultural biotechnology, Elsevier,16,,229-236.

16 Padhi Santosh Kumar, (2017) , Modern approaches to discovering new hydroxynitrile lyases for biocatalysis , ChemBioChem, Wiley,18,2,152-160.

15 Chadha, Anju., Venkataraman, Sowmyalakshmi., Preetha, Radhakrishnan., Padhi, Santosh Kumar., (2016) , Candida parapsilosis: A versatile biocatalyst for organic oxidation-reduction reactions , Bioorganic chemistry, Academic Press,68,,187-213.

14 Nedrud, David M., Lin, Hui., Lopez, Gilsinia., Padhi, Santosh K., Legatt, Graig A., Kazlauskas, Romas J., (2014) , Uncovering divergent evolution of α/β-hydrolases: a surprising residue substitution needed to convert Hevea brasiliensis hydroxynitrile lyase into an esterase , Chemical science, Royal Society of Chemistry,5,11,4265-4277.

13 Brundiek, Henrike., Padhi, Santosh Kumar., Kourist, Robert., Evitt, Andrew., Bornscheuer, Uwe T., (2012) , Altering the scissile fatty acid binding site of Candida antarctica lipase A by protein engineering

for the selective hydrolysis of medium chain fatty acids , European journal of lipid science and technology, WILEY-VCH Verlag Weinheim,114,10,1148-1153.

12 Padhi, Santosh Kumar., Haas, Michael., Bornscheuer, Uwe T., (2012) , Lipase-catalyzed transesterification to remove saturated MAG from biodiesel , European journal of lipid science and technology, WILEY-VCH Verlag Weinheim,114,8,875-879.

11 Behrens, Geoffrey A., Hummel, Anke., Padhi, Santosh K., Schätzle, Sebastian., Bornscheuer, Uwe T., (2011) , Discovery and protein engineering of biocatalysts for organic synthesis , Advanced Synthesis & Catalysis, WILEY-VCH Verlag Weinheim,353,13,2191-2215.

10 Jochens, Helge., Hesseler, Martin., Stiba, Konstanze., Padhi, Santosh Kumar., Kazlauskas, Romas J., Bornscheuer, Uwe T., (2011) , Protein engineering of α/β-hydrolase fold enzymes , Chembiochem, WILEY-VCH Verlag,12,10,1508-1517.

9 Kourist, Robert., Jochens, Helge., Bartsch, Sebastian., Kuipers, Remko., Padhi, Santosh Kumar., Gall, Markus., Böttcher, Dominique., Joosten, Henk-Jan., Bornscheuer, Uwe T., (2010) , The α/β-hydrolase fold 3DM database (ABHDB) as a tool for protein engineering , ChemBioChem, WILEY-VCH Verlag Weinheim,11,12,1635-1643.

8 Padhi, Santosh Kumar., Fujii, Ryota., Legatt, Graig A., Fossum, Sara L., Berchtold, Reto., Kazlauskas, Romas J., (2010) , Switching from an esterase to a hydroxynitrile lyase mechanism requires only two amino acid substitutions , Chemistry & biology, Elsevier,17,8,863-871.

7 Padhi, Santosh Kumar., Bougioukou, Despina J., Stewart, Jon D., (2009) , Site-saturation mutagenesis of tryptophan 116 of Saccharomyces pastorianus old yellow enzyme uncovers stereocomplementary variants , Journal of the American Chemical Society, ACS Publications,131,9,3271-3280.

6 Padhi, Santosh Kumar., Kaluzna, Iwona A., Buisson, Didier., Azerad, Robert., Stewart, Jon D., (2007) , Reductions of cyclic β-keto esters by individual Saccharomyces cerevisiae dehydrogenases and a chemo-enzymatic route to (1R, 2S)-2-methyl-1-cyclohexanol , Tetrahedron: Asymmetry, Pergamon,18,18,2133-2138.

5 Padhi, Santosh Kumar., Titu, D., Pandian, N Ganesh., Chadha, Anju., (2006) , Deracemisation of β-hydroxy esters using immobilised whole cells of Candida parapsilosis ATCC 7330: substrate specificity and mechanistic investigation , Tetrahedron, Pergamon,62,21,5133-5140.

4 Padhi, Santosh Kumar., Chadha, Anju., (2005) , Deracemisation of aromatic β-hydroxy esters using immobilised whole cells of Candida parapsilosis ATCC 7330 and determination of absolute configuration by 1H NMR , Tetrahedron: Asymmetry, Pergamon,16,16,2790-2798.

3 Padhi, Santosh Kumar., Pandian, N Ganesh., Chadha, Anju., (2004) , Microbial deracemisation of aromatic β-hydroxy acid esters , Journal of Molecular Catalysis B: Enzymatic, Elsevier,29,1-6,25-29.

2 Padhi, Santosh Kumar., Chadha, Anju., (2003) , Sodium borohydride reduction and selective transesterification of β-keto esters in a one-pot reaction under mild conditions , Synlett, © Georg Thieme Verlag Stuttgart˙ New York,2003,05,0639-0642.

1 Padhi, Santosh Kumar., Chadha, Anju., (2003) , Microbial deracemisation of beta-hydroxy esters-An important strategy towards various chiral intermediates , Chem Listy , ,97,,479-480.

Patents

Patent No/Application No Patent Title Authors Applied Year Granting Year

IN2021-41041921 A process for the preparation of optically active secondary alcohols THANGAVELU SARAVANAN, SANTOSH KUMAR PADHI, DAYANANDA SIDDAVATTAM, SIVAKUMARAN MEENAKSHISUNDERAM 2022 IN-PROCESS

IN2021-41041923 A process for the enantioselective synthesis of (R)-beta-amino butyric acid SANTOSH KUMAR PADHI, THANGAVELU SARAVANAN, DAYANANDA SIDDAVATTAM, SIVAKUMARAN MEENAKSHISUNDERAM 2022 IN-PROCESS

202341031596 Variants of hydroxynitrile lyase and their use in diastereoselective synthesis of beta-nitroalcohols SANTOSH KUMAR PADHI, AYON CHATTERJEE, BADIPATLA VISHNU PRIYA 2023 IN-PROCESS

202341031597 (R)-Hydroxynitrile lyase variants and their application in enantioselective synthesis of optically active beta-nitroalcohols SANTOSH KUMAR PADHI, BADIPATLA VISHNU PRIYA 2023 IN-PROCESS

202341047813 Baliospermum montanum hydroxynitrile lyase in the stereoselective synthesis of optically active beta-nitroalcohols of one or more chiral centers SANTOSH KUMAR PADHI, AYON CHATTERJEE, SUKADEV RANA 2023 IN-PROCESS

Projects

Title Year Duration Amount(In Lakhs) PI/I

Enantioselective synthesis of chiral pharmaceutical intermediates using engineered enzymes 2022 2 45 Santosh Kumar Padhi

Developing biocatalytic processes for the synthesis of active pharmaceutical ingredients (APIs) 2022 2 29 Santosh Kumar Padhi

Enzyme cascade biocatalysis in the stereoselective synthesis of chiral intermediates 2018 3 20 Santosh Kumar Padhi

Enzyme engineering for efficient synthesis of diastereoselective Henry products 2017 3 63 Santosh Kumar Padhi

Lab website

https://biocatalysishcu.wixsite.com/skplab “