CURRICULUM VITAE

Dr. Dinesh Nanaji Sawant
KAUST Catalysis Center, KCC
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International Publications: 21 (h index=10, Citations 282)

Educational Qualification:

Post Doctoral Research	:-	**September 2012-March 2016**
Topic of research	:-	Arifical metalloenzymes and its application in asymmetric catalysis
University	:-	King Abdullah University of Science and Technology, Saudi Arabia (www.kaust.edu.sa)
Research Supervisor	:-	Prof. Dr. Jorg Eppinger **KAUST Catalysis Centre and Technical University of Munich**

Ph.D (Chemistry)	:-	**April 2008-June 2012 (Best Ph.D thesis award)**
Topic of research	:-	Transition metal catalyzed C-C and C-N bond forming reactions.
University	:-	Institute of Chemical Technology, (Formerly UDCT), University of Mumbai, India. (www.ictmumbai.edu.in)
Research Supervisor	:-	Prof. B. M. Bhanage, Head, Department of Chemistry.

PGD-CTM (part time 2010-2012)	:-	**Post Graduate Diploma In Chemical Technology Management**
University	:-	Institute of Chemical Technology, (Formerly UDCT), University of Mumbai, India. (www.ictmumbai.edu.in)

M.Sc (Organic Chemistry)	:-	**August 2005- June 2007**
University	:-	University of Pune, India. (www.unipune.ac.in)
Class	:-	First Class

B.Sc (Chemistry)	:-	**August 2002- June 2005**
University	:-	North Maharashtra University, Jalgaon, India. (www.nmu.ac.in)
Class	:-	First Class

Job Experience:

- **Research Associate** Aug. 2007- Apr. 2008 R&D, **Nicholas Piramal Research Center**, Goregaon, Mumbai, India.
- **Junior Scientist** June 2012- Sep. 2012 R&D, **Huntsman Chemical International**, Andheri, Mumbai, India.

Awards and Extracurricular Activities:

- **DST Fast Track Young Scientist Award, Department of Science and Technology INDIA 2015**
- **KAUST post doctoral fellowship award 2012-2016**
- **"Best Ph. D Thesis Award" 2013,** Institute of Chemical Technology, Mumbai, India.
- **"Young Scientist Award"** of Indian Chemical Society 2011, University of Allahabad, India.
- **"Young Scientist Award"** at International conference "Emerging trends in Chemistry Biology Interface 2011" Kumaun University, Nainital, Uttaranchal, India.
- **"Best Paper Oral Presentation Award-2014"** at International conference "GOLD-CT-2014" 6^{th}-8^{th} Feb. 2014 North Maharashtra University Jalgaon, Maharashtra, India.
- UGC-SAP **Senior Research Fellowship** for year 2010-2012.
- UGC-SAP **Junior Research Fellowship** for year 2008-2010.
- **Abhyankar Best Research Presentation Award 2011.**
- **Best outgoing hostelite** award 2012, Institute of Chemical Technology, Mumbai.
- **Best committee member** award 2009, Institute of Chemical Technology, Mumbai.
- **Best New comer hostelite** award 2009, Institute of Chemical Technology, Mumbai.
- **General Secretary** of Hostels 2010-11, Institute of Chemical Technology, Mumbai.
- Prof.Arnikar Lecture Competition, University of Pune, Mar. 2007- **1^{st} Prize.**
- Lecture Competition, Ahmednagar College, Ahmednagar, Feb. 2007- **1^{st} Prize.**
- Lecture Competition, Ahmednagar College, Ahmednagar, Feb. 2006- **1^{st} Prize.**
- Dr. T.R. Ingle Lecture Competition, S.P.College, Pune, Feb. 2007-**2^{nd} Prize.**
- Dr. M. J. Pujari Lecture Competition, Abasaheb Garware College, Pune Jan. 2006-**1^{st} Prize.**
- University level **Talent Search Examination in Chemistry** 12^{th} Jan. 2003**: 1^{st} Prize.**
- National Service Scheme (N.S.S) for Social work:
    1) Best Cadet Award For Year 2004-2005.
    2) Best Group Leader Award For Year 2003-2004.
- **Lab Safety Representative** of BOC lab KCC, KAUST, Saudi Arabia.
- Lab Safety officer, Huntsman International, Mumbai, India.
- Lab Safety in charge, Prof. B. M. Bhanage research lab, ICT Mumbai, India.
- **Analytical instrument in charge** for BOC lab KCC, KAUST, Saudi Arabia.

International Publications: 21 (h index=10, Citation 282)

1. Palladium-catalyzed carbon-monoxide-free aminocarbonylation of aryl halides using N-substituted formamides as an amide source.
   D. N. Sawant, Y. S. Wagh, K. D. Bhatte, B. M. Bhanage*
   ***Journal of Organic Chemistry* 2011,** *76*, 5489–5494.

2. Cyanides free cyanation of aryl halides using formamide.
   D. N. Sawant, Y. S. Wagh, P. J. Tambade, K. D. Bhatte, B. M. Bhanage*
   Advanced Synthesis and Catalysis, **2011,** *353,* 781-787.

3. Carbon monoxide-free one-step synthesis of isoindole-1,3-diones by cycloaminocarbonylation of o-haloarenes using formamides.
   D. N. Sawant, Y. S. Wagh, K. D. Bhatte, B. M. Bhanage*
   ***European Journal of Organic Chemistry* 2011,** 6719–6724.

4. Palladium polyether diphosphinite complex anchored in polyethylene glycol as an efficient homogeneous recyclable catalyst for the Heck reactions.
   D. N. Sawant, Y. S. Wagh, K. D. Bhatte, A. G. Panda, B. M. Bhanage*
   ***Tetrahedron Letters* 2011**, 52, 2390-2393.

5. $FeCl_3/PPh_3$-catalyzed Sonogashira coupling reaction of aryl iodides with terminal alkynes.
   D. N. Sawant, P. J. Tambade, Y. S. Wagh, B. M. Bhanage*
   ***Tetrahedron Letters* 2010,** 51, 2758–2761.

6. Palladium on Carbon: An efficient, heterogeneous and reusable catalytic system for carbonylative synthesis of *N*-substituted phthalimides.
   M. V. Khedkar, S. R. Khan, **D. N. Sawant,** D. B. Bagal and B. M. Bhanage*
   Advanced Synthesis & Catalysis, 2011, 353 (18), 3415-3422.

7. $Pd(OAc)_2$/dppf as an efficient and highly active catalyst for the allylation of amines, alcohols and carboxylic acids with 1-phenyl-1-propyne
   Y. S. Wagh, **D. N. Sawant**, P. J. Tambade, K. P. Dhake, B. M. Bhanage*
   ***Tetrahedron* 2011**, *67*, 2414-2421.

8. Allylation of 1-phenyl-1-propyne with N- and O-pronucleophiles using polymer supported triphenylphosphine palladium complex as a heterogeneous and recyclable catalyst.
   Y. S. Wagh, **D. N. Sawant,** P. J. Tambade, K. P. Dhake and B. M. Bhanage*
   Tetrahedron Letters 2011, 52, 5676-5679.

9. Allylic amination of internal alkynes with aromatic and aliphatic amines using polymer-supported triphenylphosphane-palladium complex as a heterogeneous and recyclable catalyst.
   Y. S. Wagh, P. J. Tambade, **D. N. Sawant** and B. M. Bhanage*
   ***European Journal of Organic Chemistry* 2010,** 6981–6986.

10. Nanosize Co3O4 as a novel, robust, efficient and recyclable catalyst for A3-coupling reaction of propargylamines.
    K. D. Bhatte, **D. N. Sawant**, K. M. Deshmukh, B. M. Bhanage*
    ***Catalysis Communications*, 2011, 16 (1), 114-119.**

11. A rapid, one step microwave assisted synthesis of nanosize zinc oxide.
    K. D. Bhatte, **D. N. Sawant**, R. A. Watile, B. M. Bhanage*
    Material letters 2012, 69, 66-68.

12. One pot green synthesis of nano sized zinc oxide by sonochemical method.
    K. D. Bhatte, **D. N. Sawant**, D. V. Pinjari, A. B. Pandit, B. M. Bhanage*
    Material letters 2012, 77, 93-95.

13. Additive free microwave assisted synthesis of nanocrystalline $Mg(OH)_2$ and MgO.
    K. D. Bhatte, **D. N. Sawant**, K. M. Deshmukh, B. M. Bhanage* ***Particulogy* 2012,** 10 (3), 384-387.

14. Synthesis of powdered silver nanoparticles in aqueous medium.
    K. D. Bhatte, K. M. Deshmukh, Y. P. Patil, **D. N. Sawant**, S. I. Fujita, M. Arai, B. M. Bhanage*
    ***Particulogy* 2012,** 10 (1) , pp. 140-143.

15. Direct allylic amination of allylic alcohols with aromatic/aliphatic amines using Pd/TPPTS as an aqueous phase recyclable catalyst
    Y. S. Wagh, **D. N. Sawant**, K. P. Dhake, B. M. Bhanage*
    Catal. Sci. Technol., 2012, 2, 835-840

16. Metal-free N-iodosuccinimide-catalyzed mild oxidative C-H bond amination of benzoxazoles.
    Y. S. Wagh, **D. N. Sawant**, K. P. Dhake, B. M. Bhanage*
    ***Tetrahedron Letters* 2012,** 53 (27) , 3482-3485.

17. $Pd(OAc)_2$/DPPF-catalysed microwave-assisted cyanide-free synthesis of aryl nitriles.
D. N. Sawant, Y. S. Wagh, K. D. Bhatte, B. M. Bhanage*
***Journal of Chemical Science,* 2014,** 126 (2), 319-324

18. Rhodium catalyzed cyanide-free cyanation of aryl halide by using formamide as a cyanide source.
A. B. Khemnar, **D. N. Sawant,** B. M. Bhanag*
Tetrahedron Letters, 2013, 54 (21), 2682-2684

19. Water promoted allylic nucleophilic substitution reaction of (E)-1,3-diphenyl allyl acetate.
Dinesh Sawant, Seema Ghorpade, Tobias Helbitch, Nethi Sekar, Jorg Eppinger*
Green Chemistry (Manuscript to be submitted)

20. Assymetric tsuji trost reaction using artificial palladium based metalloenzymes.
Dinesh Sawant, Arwa Makki, Johannes Fischer, Seema Ghorpade, Jorg Eppinger*
Angewandte Chemie International Edition (Manuscript to be submitted)

21. Heterogeneous protocol for click labeling of biomolecules using a recyclable Cu_2O/Cu nano wires.
Arwa Makki, **Dinesh Sawant**, Seema Ghorpade, Kuo-Wei Huang, Jorg Eppinger*
Nature Chemistry (Manuscript to be submitted)

Conferences: 8

1. Oral presentation at "**15th Asian Chemical Congress**" 19th-23rd August 2013 at Sentosa, Singapore.
2. Oral presentation at "**GOLD-CT-2014**" 6-8th February 2014 at NMU, Jalgaon, India.
3. Oral Presentation at "**Annual convention of chemists**" 2nd-5th December 2011 at Allahabad University, UP, India.
4. Poster Presentation at International conference "**Emerging trends in Chemistry Biology Interface 2011**" 3rd-5th Nov 2011, at Kumaun University, Nainital, Uttaranchal, India.
5. Oral Presentation at "**20th National Symposium on Catalysis for energy conversion and conversation of Environment"**, 19th - 22ndDecember 2010, Catalysis Society of India, NCCR, IIT Madras, India
6. Poster Presentation at "DAE-BRNS, **"3rd International Symposium on Materials Chemistry (ISMC- 2010)"**, 7th - 11th December 2010, Chemistry Division Bhabha Atomic Research Centre, Mumbai, India.
7. Oral presentation at "**NSCAM-2010**" 22nd Feb 2010, Department of Chemistry, University of Mumbai, India.
8. Oral presentation at "**24th RESEARCH SCHOLARS' MEET (RSM – 2012)**" 17th-18th Feb 2012, Department of Chemistry, S.I.E.S College, University of Mumbai, India

Workshop and Research related courses:

- Completed Hazardous waste training, KAUST, Saudi Arabia.
- Completed Fire Extinguisher training, KAUST, Saudi Arabia.
- Completed Chemical Spill training, KAUST, Saudi Arabia.
- Completed Laser Safety training, KAUST, Saudi Arabia.
- Completed Safety handling of liquid nitrogen and cryogenic material training.
- Completed Floor warden training, KAUST, Saudi Arabia.
- Completed First-Aid training, KAUST, Saudi Arabia.
- Selected and attended **"Orientation Program in Catalysis Research"** conducted by National Center for Catalysis Research, **Indian Institute of Technology Madras (IIT Madras)** on 17th Nov.2008 to 8th Dec. 2008.
- Attended workshop on "Catalyst Characterization & Catalysis" organized by Department of Chemical Engineering, **ICT, Mumbai** on 23-28 Jun. 2008.
- Attended workshop on "Safety in Chemical Laboratory" organized by **Nicholas Piramal Research Center, Mumbai,** 3-5 Mar. 2008.
- Attended the course of instruction of the John Ambulance Association in "First Aid to The Injured" organized by **NPRC, Mumbai.** On 6th Mar 2008.

Personnel Details

Date of Birth	: **9th July 1985**
Sex	: Male
Marital Status	: Married
Nationality	: Indian
Language Known	: English, Hindi, Marathi, Arabic (Beginner)
Permanent Address	: 114, Kolwale Nagar, Malegaon Road, Dhule, Maharashtra, India 424001

References:

Prof. B. M. Bhanage (FRSC, FMAC)
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Mob No: 9323994018
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Prof. Dr. Jörg Eppinger
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King Abdullah University of Science and Technology,
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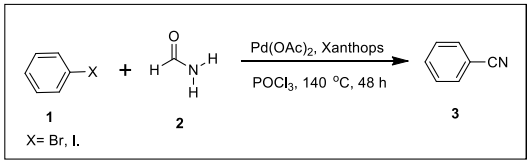
Past Research and Achievements of Dr. Dinesh Sawant

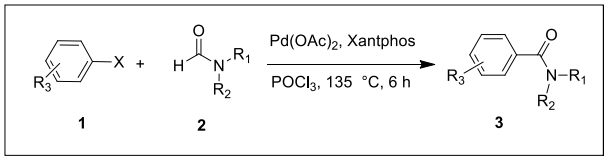
During my Ph.D, Post Doctoral Research and Industrial Job, I worked on various areas of catalysis such as Homogenous catalysis, Heterogeneous catalysis, Nano catalysis and Bio-organometallic catalysis. I have published 18+ international publications, received 2 young scientist awards and 2 Oral presentation awards. During my industrial job at Piramal Lifesciecne, my area of research was development of qunoline based anti-inflammatory molecules and I had done synthesis 89 new derivatives of qunoline, purified, characterized and screened them for biological activity. During my stay at R&D Huntsman International I have developed plant scale palladium based catalytic method for synthesis of fluorescent whitening agents. Details of work done in Ph.d and Post Doctoral Research is as follows

Ph.D Research Work:

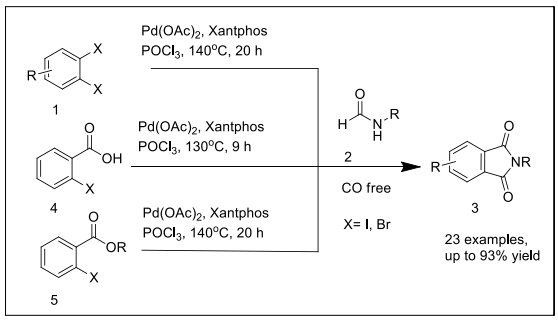
Through the past several decades, advancement in the field of transition metal catalysis has provided numerous efficient methods for the synthesis of complex organic molecule. In this context I have developed new method for synthesis of amides, nitriles and various heterocycles (Scheme 1, 2 and 3). My Ph.D work also address important aspect of cross coupling reactions such as development of new iron catalyzed methodology for Sonogashira and homogenous recyclable catalyst for Heck coupling reactions (Scheme 4 and 5). During Ph.D I also worked on synthesis and application of heterogeneous organometallic catalyst for allylic amination. My Ph.D work also involves development of new microwave and sonochemical method for synthesis of nanoparticles. All of the research work done during Ph.D has been already published in reputed research journals **Some of the representative protocols are as follows:**



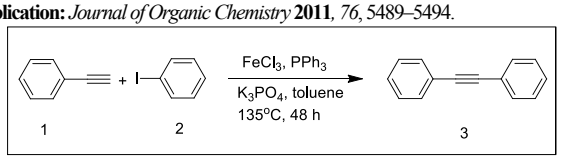
Scheme 1: Cyanide free cyanation
Publication: *Advanced Synthesis and Catalysis,* **2011,** *353,* 781-787



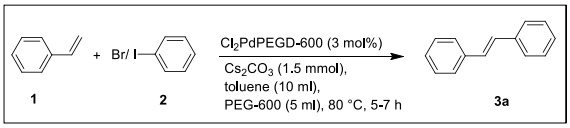
Scheme 2: Carbon monoxide free amino carbonylation (Amide synthesis)
Publication: *Journal of Organic Chemistry* **2011**, *76*, 5489–5494.



Scheme 3: one-step synthesis of isoindole-1,3-diones
Publication: *European Journal of Organic Chemistry* 2011**,** 6719–6724.



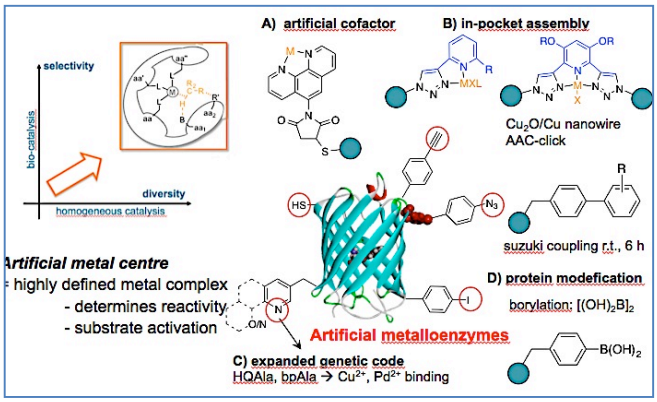
Scheme 4: Iron catalyzed sonogashira coupling
Publication: *Tetrahedron Letters* **2010,** 51, 2758–2761



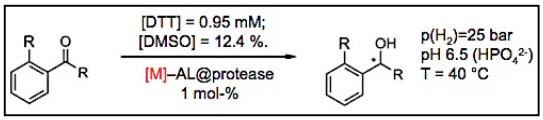
Scheme 5: Homogeneous recyclable catalyst for the Heck reactions
Publication: *Tetrahedron Letters* **2011**, 52, 2390-2393

Post doctoral research Work:

In research lab of Prof. Dr. Jorg Eppinger I worked on collaborative project of KAUST, Saudi Arabia and TU Munich Germany on topic development of bio-organometallic complexes for asymmetric catalysis. Artificial metalloenzymes is a new concept in which we are making bio-organometallic catalyst for asymmetrical catalysis (Scheme 6). Artificial metalloenzymes have been successfully applied for asymmetric reactions such as Tsuji trsot, Diels Alder, **Asymmetric Hydrogenation** (Scheme 7), 1,2 addition of Phenyl boronic acid. In all cases we got excellent enantioselectivity and high conversion. I also worked on synthesis and application of Bedford type of palladium catalyst for application in cross coupling reactions.



Scheme 6: Artificial Metalloenzymes for asymmetric catalysis



Scheme 7: Transfer hydrogenation using artificial metalloenzeme

reaction	Suzuki	Sonogashira	Ar-B(OH)$_3$ + R-CHO	Tsuji-Trost	Heck
products					
[Pd] / mol-%	0.02	0.5 / ***0.005***	0.01	0.002	0.3
T	30 °C	40 °C / ***50 °C***	30 °C	30 °C	80 °C
t	6 h	4 h / ***32 h***	2 h	16 h	16 h
base	2.5 eq. Na_2CO_3	2 - 10 eq. NEt_3	1.5 eq. Na_2CO_3	$Na(BAr_4)$	
variability	**62 products**	**21 products**	**23 products**	**12 products**	
microwave 100 °C, 15 min	$4*10^{-7}$ mol-% Pd; TON_{max} = 63'000'000; TOF_{max} = 70'000 s^{-1}	oligomers	10^{-4} mol-% Pd	10^{-5} mol-% Pd	

Scheme 8: Application of new Bedford catalyst in aqueous catalytic reactions

I have hands on analytical instruments such as **NMR**, **HPLC, GCMS, LCMS, FT-IR, ICP-MS, and TGA DSC etc.** I have done 12 certificate courses on research lab safety and I am Lab Safety Representative at KAUST catalysis center. I have **guided 2 Ph.D students and 2 master students** for their thesis projects at KAUST.

Catalytic Synthesis of Non-standard Peptides

Noyori Labratory, Research Center for Materials Science
Research fellow: Dinesh Sawant

Abstract of Research

Non-standard peptides or sometimes also known as unnatural peptides or peptidomimetics. It is a class of compounds that contain moieties that do not usually exist in the nature; where in the nature, only 20 proteinogenic amino acids are available to be encoded by natural messenger RNA. In general, non-standard peptides that we can always see containing nonproteinogenic side chain, a modified backbone or macrocyclized backbone. Non-standard peptides are important because they can improve cell permeability of peptides, have higher *in vivo* stability (stable against peptidase) and conformational rigidity. As an example application of non-standard peptide, I would like to mention ciclosprin (also spell as cyclosporine), it is a cyclic non-ribosomal peptide that contains eleven L-amino acids and one D-amino acid. This compound is listed in the WHO Model List of Essential Medicines. It is an immunosuppressant drug that is widely used in organ transplantation to prevent rejection; it reduces the activity of immune system by interfering with the growth of T cell. Since non-standard peptide may have outstanding applications in therapeutics, the development of methods to construct highly diverse non-standard peptide libraries is important for the discovery of drug candidates or sheer light on some biochemistry process.

There are methodologies to control and make use of ribosome for amino acids incorporation. However, one serious limitation facing by protein engineers is the availability of only 20 proteinogenic amino acids, which can be encoded by natural messenger RNA. The lacking of structural diversity due to restriction of availability is not a very practical way to construct non-peptide libraries. Although we can address this issue by site-directed mutagenesis, it requires long time and a lot of experiments to reach the ultimate goal.

In contrast, synthesizing non-peptide using chemical approach is straightforward and fast. Nevertheless, we are lacking of efficient catalytic approaches that allow us to access all kind of non-standard peptide. In fact, the drawbacks in the current non-standard peptides synthesis using non-catalytic chemical approach including, the requirement of stoichiometric amount of coupling reagent, which may lower the atom efficiency causing by the stoichiometric amount of salt waste co-generated along the reaction. In addition, solubility of peptide is also hindering the process of modification (reaction) from proceeding. Although solubility can somehow be solved by adding LiCl (as additive) to interrupt the β-sheet formation, unfortunately, not always LiCl can destroy the hydrogen bonding network effectively. As an alternative, peptide chemists are covalently introducing soluble tags on the amide nitrogen, to prevent hydrogen bonding network. However, this requires a lengthy and tedious synthesis steps during the starting material (amino acids) preparation.

In this project, we plan to prepare catalysts that can be used in non-standard peptide libraries construction. We will be going into two directions, the first one is a catalytic bottom-up approach, which is catalytic stepwise linking of amino acids and introduces or incorporates the non-proteinogenic amino acid residues in certain desired spots along the backbone of the peptides. The second approach is a direct modification of peptides or proteins. Direct modification of peptides or proteins is very attractive but is a very challenging approach, it is because peptides or proteins always have bad solubility and they contain many functional groups, which may interrupt with the catalyst during the catalytic chemical modification.

In order to achieve the ultimate goal of this project, we plan to use our phosphazene-base organocatalyst, i.e. $TAPL_{3-6}$. Based on our previous experience, we will redesign TAP into a robust organocatalyst with high chemoselectivity and at the same time has ability to work in polar solvents, such as H_2O, MeCN, DMSO, DMF, HFIP, TFA and so on. The modification of catalyst will be done by changing the ligands on phosphorous (e.g. amines, alcohols, thiol and so on). We believe it will be a breakthrough in peptide chemistry, if we can establish a non-peptide synthesis using phosphazene-based organocatalysis.