CURRICULAM VITAE

DR. UPENDRA SHARMA

Scientist
Natural Product Chemistry and Process Development Division
CSIR-Institute of Himalayan Bioresource Technology
Palampur-176 061
E-mail: upendra@ihbt.res.in; upendraihbt@gmail.com
http://www.ihbt.res.in/php/cv/sctInfo.php?id=34049

PROFESSIONAL EXPERIENCE

Scientist (1st September 2014 onwards) at NPC&PDD, CSIR-IHBT, Palampur

Postdoctral Fellow (14th March 2014- 22nd August) at KAIST, South Korea, working on transition metal catalyzed remote C-H activation.

Young Scientist-DST Fast Track (24th May 2013-11th March 2014) at IIT Bombay, worked on development of catalytic processes for hetrocycle synthesis through multiple C-H activation.

Research Assistant (6th Nov. 2012-22nd May 2013) at IIT Bombay, worked on stereoselective nitration and trifluoromethylation of olefins.

EDUCATION

2007 – 2012	**PhD (Organic Chemistry)** GNDU. Amritsar, Punjab / CSIR-IHBT, Palampur **Mentor**: Dr. Bikram Singh, Chief Scientist & HOD, NPC&PDD, CSIR-IHBT (***defended on 26th Oct. 2012***) entitled "**Phytochemical Investigation of *Tinospora cordifolia, Asparagus racemosus* and Synthesis of Phthalimide Derivatives for Immunomodulatory Active Molecules**"
2005-2006	**Research Scholar** in Panjab University, Chandigarh
2003 - 2005	**M.Sc Chemistry,** DAV collage, Jalandhar, GNDU, Amritsar, 1st Class with 63 %
2002 - 2003	**B.Ed.**, Jammu University, Jammu, 1st Class with 67 %
1999 - 2002	**BSc**, University Govt. College Chowari, HPU, Shimla 1st Class 72%

GROUP BUSINESS

- **Synthetic methodology development** (C-H activation/functionalization leading to value added molecules)

- **Isolation and structure elucidation of plant secondary metabolites** from Himalayan medicinal plants using modern spectroscopic techniques including NMR (1D & 2D), LC-MS, IR and UV-vis. Development of eco-friendly processing technology at pilot scale for bioactives of industrial importance.

- **Chemical Profiling** using NMR (1D & 2D) and hyphenated chromatographic techniques such as UPLC-MS/MS and GC-MS

- **Analytical Chemistry** using UPLC, HPLC & GC for standardization of plant extracts through development of quantification method for marker compounds

- **Cellulose Prospection** from underutilized Hiamalyan Bioresource for valuable products

AWARDS/HONOURS

- Manjushree Pal Memorial Award for Best Oral Presentation from Ethanopharmacology Society of India, Kolkata (2017)
- Chaired a full session in Seventh Euro-India International Conference on Holistic Medicine (ICHM-2017), Kottayam, Kerala, India on 15-17 September 2017
- Chaired poster session in 4th International Congress of the Society for Ethnopharmacology, India Healthcare in 21st century: Perspectives of Ethnopharmacology & Medicinal Plant Research, UKA Tassadia University, Bardoli, Surat, Gujrat on February 23-25, 2017
- Thieme Chemistry Journal Award (2016)
- D S Kothari Postdoc Fellowship (2012)
- Fast Track Young Scientist project for three years (2012)
- Postdoc Fellowship KAIST, South Korea (2014)
- CSIR Senior Research Fellowship (2009)
- CSIR Junior Research Fellowship (2007)
- GATE (2007)
- CSIR-NET (2006)

INSTITUTIONAL RESPONSIBILITIES

- DAC member of Ph.D students enrolled in AcSIR
- Member of Project Formulation Committee

• PROJECTS

	Project Title	Funding Agency	Duration	Role
1	Transition Metal Catalyzed Simultaneous Distant C-H Activation and Hetero-atom Transfer: Direct Synthesis of Bioactive Derivatives of Heterocyclic Compounds	**SERB-DST (EMR/2014/001023)**	**2015-2018 Completed**	**PI**
2	High throughout genotyping to expedite the genetic characterization and dissection of important agronomic traits of tea	**DST**	**2018-2021**	**Co-PI**
3	Exploration of Himalayan Plants for Novel Antimalarial Agents: Characterization of potential molecules.	CSIR/Agri Nutri Biotech Mission	**2019-2020**	**PI**
4	Phytopharmaceutical development from as *Cissampelos pareira* per regulatory guidelines of AYUSH	CSIR/Phytopharma Mission	**2017-2020**	**PI**
5	Technology packages for production of GMP grade medicinal plant extracts of *Ginkgo biloba*	CSIR/Phytopharma Mission	**2017-2020**	**PI**
6	Phytochemical investigation of selected high value rare, endangered and threatened (RET) medicinal Plants	CSIR/Phytopharma Mission	**2017-2020**	**Co-PI**
7	Nutraceutical formulation for boosting bone and cartilage health	CSIR/Neutraceutical Mission	**2018-2020**	**Co-PI**
8	A kaempferol-enriched nutraceutical formulation for ageing bone: to concurrently stop bone loss and restoring lost bone (CSIR-CDRI, CSIR-IHBT)	CSIR/Neutraceutical Mission	**2018-2020**	**Co-PI**
9	Identification of improved clone(s) of Stevia rebaudiana (Bertoni)	CSIR/Agri Nutri BiotechMission	**2018-2020**	**Co-PI**

DISSERTATIONS SUPERVISED

(a) **Ph.D:** Awarded **1** Current: **9**

Pursuing	At the stage of thesis submission	Awarded
1. Mr. Inder Kumar 2. Mr. Ankit Kumar Dhiman 3. Mr. Patil Shiv Prasad Suresh 4. Mr. Devesh Chandra 5. Diksha Parmar 6. Surekha Kumari	1. Ritika Sharma 2. Mrs. Deepali Katoch 3. Mr. Rakesh Kumar	Dr. Vinod Bhatt completed thesis entitled "**Phytochemical and Synergy-Directed Biological Studies of *Zanthoxylum* Species"** on 15th Feb, 2018.

(b) **Post graduation training/thesis:** National: **9** International: **1**

Awarded
1. **Mr. Amit**, Amity University Gurgoan, Haryana, completed one month training entitled "**Phytochemical Investigation of *Cissampelos pareira***" in July, 2017. 2. **Ms. Reetu Bala**, SGGS College, Punjab University, Chandigarh, completed one month training entitled "**Lewis Acid Catalyzed N-alkylation of 1,2,3,4-Tetrahydroisoquinolines with Acrylates**" in July, 2017. 3. **Mr. Sachin**, Amity University Gurgoan, Haryana, completed one month training entitled "**Synthesis of Quinoline *N*-Oxides and Quinoline Ylides**" in July, 2017. 4. **Mr. Saurabh Kumar**, SHUATS, Allahabad, completed one month training entitled "**Fractionation and Isolation of Secondary metabolites from *Cissampelos pareira***" in July, 2017. **5. Ms. Jyoti**, Amity University Gurgoan, Haryana, completed two month training entitled "**Extraction, Fractionation and Isolation of Secondary Metabolites from *Cissampelos pareira* Roots**" in March-April, 2018. 6. **Mr. Sachin**, Amity University Gurgoan, Haryana, completed two month training entitled "**Functionalization of Quinoline and their characterization**" in March-April, 2018. 7. **Ms. Vivekshu**, Chandigarh University,Chandigarh, completed one month training entitled "**Analytical Techniques used in Phytochemical investigations**" in May-June, 2018. 8. **Ms. Alka, Devi**, Ahilya Vishwavidyalaya, Indore (M.P.) completed six month training entitled "**Phytochemical and In-silico biological studies of *Cissampelos pareira***" in January-June, 2018. 9. **Mr. Vikrant**, Shoolini University, Solan, HP, completed two-month training entitled "**Synthesis of Quinoline N-ocide and maleimides**" in June-August, 2018. **International Student Under CSIR-TWAS Fellowship** 10. **Mrs. Adenike Evelyn ADENIYI**, University of Ibadan, Nigeria completed six-month TWAS-CSIR fellowship research on thesis entitled "**Suitability of Seed Oil of *Hildegardia barteri* (Mast. Kosterm) for Production of Selected Bio-Products"** in January-July, 2018.

MEMBERS OF PROFESSIONAL SOCIETY

Life member of Analytical Society of Analytical Scientists since 2008 (LM No. 2008/38).

TRAINING

Attended one month "CSIR Technology Led Entrepreneurship Program" at IICT, Hyderabad in 2008.
Attended ten days "Scientist Induction Training Programme" at HRDC, Ghaziabad in 2016.

EDITORSHIP

1 Editorial Board Member **Student Journal of chemistry** (Student's Publishing Services, Antalya, Turkey)
2 Editorial Board Member **Pharmacolgia a Science Magzine** (pISSN: 2044-4648; eISSN: 2044-4656)

REVIEWER FOR JOURNALS

Organic Letters

The Journal of Organic Chemistry

ACS Omega

Advance Synthesis & Catalysis

Green Chemistry

New Journal of Chemistry

Chemistry Select

Journal of Ethanopharamcology

Biomedicine & Pharmacotherapy

Natural Product Reports

Natural Product Communications

Journal of Functional Food

Separation Science and Technology

Toxicology and Environmental Health Sciences

PUBLICATIONS

Publications

John Wiley	American Chemical Society	Royal Society of Chemistry	Taylor & Francis
Angew Chem ***2***	*Org Lett* ***1***	*Green Chem* ***3***	*Catal Rev* ***2***
Chem Eur J ***1***	*J Org Chem* ***7***	*Chem Commun* ***2***	
Adv Synth & Catal ***4***		*Catalysis Science & Technology* ***1***	
Eur J Org Chem ***2***		*Org Biomol Chem* ***2***	
Asian J Org Chem ***4***			

Total: **93** Citation: **>1709** h-index: **22** i-10 index: **40**

After Independent Research Lab: **43**

Book Chapter: **2**

Invited/Oral Presentations: **7**

Patent: **2** (filed)

Paper presented in conferences: **19**

S. No.	Names of all the authors	Title of the paper	Name of the journal, volume, year and page
93	Ritika Sharma, Rakesh Kumar, **Upendra Sharma***	Rh/O_2-Catalyzed C8 Olefination of Quinoline *N*-oxides with Activated and Unactivated Olefins.	*The Journal of Organic Chemistry*, 2019, DOI: 10.1021/acs.joc.8b03176.
92	Rakesh Kumar, Rohit Kumar, Devesh Chandra, **Upendra Sharma***	Cp*Co(III)-Catalyzed Alkylation of Primary and Secondary C(sp3)-H Bonds of 8-Alkylquinolines with Maleimides.	*The Journal of Organic Chemistry*, 2019, DOI: 10.1021/acs.joc.8b02974.
91	Deepali Katoch*, Dharmesh Kumar, Yogendra S Padwad, Bikram Singh,* **Upendra Sharma***	Pseudolycorine *N*-oxide, a new N-oxide from *Narcissus tazetta.*	*Natural Product Research,* 2019, accepted
90	Deepali Katoch*, Dharmesh Kumar, Yogendra S Padwad, Bikram Singh,* **Upendra Sharma***	Narciclasine-4-O-*β*-*D*-xylopyranoside, a new narciclasine glycoside from *Zephyranthes minuta.*	*Natural Product Research,* 2019, doi.org/10.1080/14786419.2018.1527836
89	Ritika Sharma, Rakesh Kumar, Rohit Kumar, Pooja Upadhyay, Dinkar Sahal, **Upendra Sharma***	Rh(III)-Catalyzed C(8)-H Functionalization of Quinolines via Simultaneous C-C and C-O Bond Formation: Direct Synthesis of Quinoline Derivatives with Antiplasmodial Potential.	*The Journal of Organic Chemistry*, 2018, *83*, 12702-12710.
88	Rakesh Kumar, Sandeep Chaudhary, Rohit Kumar, Pooja Upadhyay, Dinkar Sahal, **Upendra Sharma***	A Catalyst and Additive-free Diastereoselective 1,3-Dipolar Cycloaddition of Quinolinium Imides with Olefins, Maleimides and Benzynes: Direct Access to Fused *N,N´*-Heterocycles with Promising Activity against Drug Resistant Malaria Parasite.	*The Journal of Organic Chemistry*, 2018, *83*, 11552-11570.

87	Rakesh Kumar, Ritika Sharma, Inder Kumar, Pooja Upadhyay, Ankit Kumar Dhiman, Rohit Kumar, Rakesh Kumar, Rituraj Purohit,* Dinkar Sahal* and **Upendra Sharma***	Evaluation of antiplasmodial potential of C-2 and C-8 modified quinolines: in vitro and in silico study.	*Medicinal Chemistry, 2018, DOI: 10.2174/1573406414666181015144413*
86	Ritika Sharma, and **Upendra Sharma***	Remote C-H Bond Activation/Transformations: A Continuous Growing Synthetic Tool; Part II.	*Catalysis Reviews: Science and Engineering*, 2018, *60*, 497-565.
85	Inder Kumar, Ritika Sharma, Rakesh Kumar, Rakesh Kumar, and **Upendra Sharma***	C70 Fullerene-Catalyzed Metal-Free Photocatalytic ipso-Hydroxylation of Aryl Boronic Acids: Synthesis of Phenols.	*Advanced Synthesis & Catalysis,* 2018, *360*, 2013-2019.
84	Inder Kumar, Rakesh Kumar and **Upendra Sharma***	Recent Advances in Regioselective Synthesis of Indoles *via* C-H Activation/Functionalization.	*Synthesis,* 2018, *50*, 2655-2677.
83	Shruti Sharma, Vijeta Patial,; Dharam Singh, **Upendra Sharma**,* Dinesh Kumar*	Antimicrobial homoisoflavanoids from the rhizomes of Polygonatum verticillatum	*Chemistry and Biodiversity* 2018, *15*, e1800430
82	Vinod Bhatt, Neeraj Kumar **Upendra Sharma** and Bikram Singh*	Comprehensive metabolic profiling of *Zanthoxylum armatum* and *Zanthoxylum acanthopodium* leaves, bark, flowers and fruits using Ultra high performance liquid chromatography. *(Highlighted in Cover Page of the Journal:* **doi.org/10.1002/sscp.201870017**)	*Separation Science Plus,* 2018, *1*, 311.
81	Dinesh Kumar and **Upendra Sharma***	High-performance thin-layer chromatography: An economical alternative for the quality control of medicinal plants and derived products. *(Highlighted in Cover Page of the Journal:* **doi.org/10.1002/sscp.201870007**)	*Separation Science Plus,* 2018, *1*, 100.
80	Ritika Sharma, Rupali	Comprehensive Metabolomics	*Natural Product*

	Jandrotia, Bikram Singh, **Upendra Sharma*** and Dinesh Kumar*	Study of Traditionally Important *Rumex* Species Found in Western Himalayan Region.	*Communications,* 2018, *13*, 189.
79	Ashun Chaudhary, Sonika Choudhary, **Upendra Sharma**, Adarsh Pal Vig, Bikram Singh and Saroj Arora*	Purple Head Broccoli (*Brassica oleracea* L. var. italica Plenck), A Functional Food Crop for Antioxidant and Anticancer Potential.	*Journal of Food Science and Technology* 2018, *55*, 1806.
78	Dinesh Kumar,* Pawan Kumar and **Upendra Sharma***	UPLC-DAD-MS based quality control and discrimination analysis of different aerial parts of *Crataegus rhipidophylla* Gand. found in Indian western Himalaya.	*Analytical Chemistry Letters*, 2018, *8*, 177.
77	Manoranjan Kumar, Krishna Thakur, Sushila Sharma, Onkar S. Nayal, Neeraj Kumar, Bikram Singh* and **Upendra Sharma***	Solvent-free, L-leucine catalyzed direct dehydrative esterification of carboxylic acids with alcohols: Direct synthesis of 3-alkoxy 1(3H)-isobenzofuranone.	*Asian Journal of Organic Chemistry,* 2018, *7*, 227.
76	Ankit Kumar Dhiman, Rakesh Kumar, Rakesh Kumar* and **Upendra Sharma***	Metal-free synthesis of 2-substituted-3-(2-hydroxyaryl)quinolines and 4-(2-hydroxyaryl)acridines via benzyne chemistry.	*The Journal of Organic Chemistry*, 2017, 82, 12307.
75	Ritika Sharma, Inder Kumar, Rakesh Kumar, **Upendra Sharma***	Rhodium-Catalyzed Remote (C-8) alkylation of Quinolines with Activated and Unactivated Olefins: Mechanistic Study and Total Synthesis of EP4 Agonist.	*Advanced Synthesis & Catalysis*, 2017, *359*, 3022.
74	Manoranjan Kumar, Vinod Bhatt, Onkar S. Nayal, Sushila Sharma, Vishal Kumar, Maheshwar S. Thakur, Neeraj Kumar, Rajaram Bal,* Bikram Singh* and **Upendra Sharma***	CuI nanoparticles as a recyclable heterogeneous catalyst for C-N bond formation reactions.	*Catalysis Science & Technology,* 2017, *7*, 2857
73	Rakesh Kumar, Rakesh Kumar, Ankit Kumar Dhiman and **Upendra Sharma***	Regioselective Metal-free C(2)-H Arylation of Quinoline *N*-oxides with Aryldiazonium Salts/Anilines under Ambient Conditions	*Asian Journal of Organic Chemistry,* 2017, *6*, 1043.
72	Arti Sharma, Ritika	Quantitative and Qualitative	*Natural Product*

	Sharma, Rohit Arora, Saroj Arora, Bikram Singh* and **Upendra Sharma***	Analysis of *Eruca sativa* and *Brassica juncea* Seeds by UPLC-DAD and UPLC-ESI-QTOF.	*Communications,* 2017, *12*, 1485.
71	Vinod Bhatt, Sushila Sharma, Neeraj Kumar, **Upendra Sharma** and Bikram Singh	Chemical Composition of Essential Oil among Seven Populations of *Zanthoxylum armatum* from Himachal Pradesh: Chemotypic and Seasonal Variation.	*Natural Product Communications,* 2017, *12*, 1643.
70	Manoranjan Kumar, Sushila Sharma, Krishna Thakur, Onkar S. Nayal, Vinod Bhatt,[Maheshwar S. Thakur, Neeraj Kumar, Bikram Singh*, and **Upendra Sharma***	Montmorilonite K10 catalyzed microwave assisted direct amidation of unactivated carboxylic acids with amines: Applicable for maintaining chiral integrity of substrates.	*Asian Journal of Organic Chemistry,* 2017, *6*, 342.
69	Shruti Sharma, Vinod Bhatt, Neeraj Kumar, Bikram Singh,* and **Upendra Sharma***	Locational Comparison of Essential Oils from Selected Conifers of Himachal Pradesh.	*Natural Product Research,* 2017, *31*, 1578.
68	Vinod Bhatta, Sushila Sharmaa, Neeraj Kumar, **Upendra Sharma**, Bikram Singh*	Simultaneous quantification and identification of flavonoids, lignans, coumarin and amides in leaves of *Zanthoxylum armatum* using UPLC-DAD-ESI-QTOF–MS/MS.	*Journal of Pharmaceutical and Biomedical Analysis,* 2017, *132*, 46.
67	Madhu Chandel, Manish Kumar, **Upendra Sharma**, Bikram Singh, Satwinderjeet Kaur	Investigations on antioxidant, antiproliferative and COX-2 inhibitory potential of alkaloids from *Anthocephalus cadamba* (Roxb.) Miq. Leaves.	*Chemistry & Biodiversity*, 2017, 14, e1600376.
66	Rajeev Rattan,* Bharat Inder Fozdar, Veena Gautam, Ritika Sharma, Dinesh Kumar* and **Upendra Sharma**,*	Cuspidate A, New Anti-Fungal Triterpenoid Saponin from *Lepidagathis cuspidate*.	*Natural product Research,* 2017, *31*, 773.
65	Madhu Chandel, Manish Kumara, **Upendra Sharma**, Bikram Singh and Satwinderjeet Kaur*	Antioxidant, Antigenotoxic and Cytotoxic Activity of *Anthocephalus cadamba* (Roxb.) Miq. Bark Fractions and their Phytochemical Analysis Using UPLC-ESI-QTOF-MS.	*Combinatorial Chemistry & High Throughput Screening,* 2017, *20*, 760.
64	Sushila Sharma, Manoranjan Kumar, Vinod	Vasicine from *Adhatoda vasica* as an organocatalyst for metal-free	*Tetrahedron Letter,* 2016, *45*, 5003.

	Bhatt, Onkar S. Nayal, Maheshwar S. Thakur, Neeraj Kumar, Bikram Singh,* and **Upendra Sharma***	Henry reaction and reductive heterocyclization of *o*-nitroacylbenzenes.	
63	Sushila Sharma, Manoranjan Kumar, Onkar S. Nayal, Maheshwar S. Thakur, Vinod Bhatt, Neeraj Kumar, Bikram Singh* and **Upendra Sharma***	Designing of Vasicine Derived Ligands and Their Application for Ruthenium Catalyzed Transfer Hydrogenation Reactions in Water: Synthesis of Amines and Alcohols	*Asian Journal of Organic Chemistry,* 2016, 5, 1471-1479.
62	Sushila Sharma, Manoranjan Kumar, Shruti Sharma, Onkar S. Nayal, Neeraj Kumar, Bikram Singh* and **Upendra Sharma***	Microwave Assisted Vasicine Catalyzed Synthesis of Phenanthridinones via Intramolecular C-H Arylation with Aryl Halides. *(Highlighted in Synfacts 2016, 12(12): 1244)*	*Organic & Biomolecular Chemistry*, 2016, 14, 8536.
61	Onkar S. Nayal, Maheshwar S. Thakur, Vinod Bhatt, Manoranjan Kumar, Neeraj Kumar, Bikram Singh* and **Upendra Sharma***	Synthesis of tertiary arylamines: Lewis acid-catalyzed direct reductive *N*-alkylation of secondary amines with ketones through an alternative pathway.	*Chemical Communications*, 2016, 52, 9648.
60	Rakesh Kumar, Inder Kumar, Ritika Sharma, **Upendra Sharma***	Catalyst and Solvent-Free alkylation of Quinoline *N*-oxides with Olefins: Direct Access to Quinoline Substituted α–Hydroxy Carboxylic Derivatives.	*Organic & Biomolecular Chemistry*, 2016, 14, 2613.
59	Dinesh Kumar,* Ashu Gulati, **Upendra Sharma***	Determination of Theanine and Catechin in Camellia sinesis (Kangra Tea) Leaves by HPTLC and NMR Techniques.	*Food Analytical Methods*, 2016, 9, 1666.
58	Madhu Chandel, Manish Kumar, Upendra Sharma, Neeraj Kumar, Bikram Singh, Satwinderjeet Kaur	Isolation and characterization of flavanols from *Anthocephalus cadamba* and evaluation of their antioxidant, antigenotoxic, cytotoxicand COX-2 inhibitory activities.	*Brazilian Journal of Pharmacognosy,* 2016, *26*, 474.
57	Ashun Chaudhary, Sonika Choudhary, **Upendra Sharma** and Saroj Arora	In vitro evaluation of antioxidant, antiproliferative and apoptotic induction on prostate cancer cell line by non-polar constituents in brassica sprouts extracts.	*Indian J. Pharmaceutical Sciences*, 2016, *78*, 615.
56	Rajeev Rattan, Amita	Preliminary Phytochemical	*International*

	Kumari, Veena Gautam, Bharat Inder Fozdar, **Upendra Sharma*** and Dinesh Kumar*	Screening, Antioxidant and Antifungal Activity *of Lepidagathis cuspidate*.	*Journal of Drug Development and Research* 2016, *8*, 001-003.
55	Ritika Sharma, Rakesh Kumar, Inder Kumar, **Upendra Sharma***	Rh(III)-Catalyzed Dehydrogenative Coupling of Quinoline *N*-Oxides with Alkenes: *N*-Oxide as Traceless Directing Group for Remote C-H Activation.	*European Journal of Organic Chemistry* 2015, 7519.
54	Ritika Sharma, Rakesh Kumar, Inder Kumar, Bikram Singh, **Upendra Sharma***	Selective C-Si Bond Formation through C-H Functionalization.	*Synthesis*, 2015, *47*, 2347.
53	Ritika Sharma, Kavita Thakur, Rakesh Kumar, Inder Kumar, **Upendra Sharma***	Distant C-H Activation/Functionalization: A New Horizon of Selectivity beyond Proximity.	*Catalysis Reviews: Science and Engineering*, 2015, *57(3)*, 345.
52	Ritika Sharma, Kavita Thakur, **Upendra Sharma***	Olefins as Unprecedented Feedstock for the Synthesis of Valuable Heterocycles: Regioselectivity Remains an Issue**.**	*Synlett*, 2015**,** *26*, 137.
51	Rajeev Rattan*, S. G. Eswara Reddy, Shudh Kirti Dolma, Bharat Inder Fozdar, Veena Gautam, Ritika Sharma, **Upendra Sharma***	Triterpenoid Saponins from *Clematis graveolens* and Evaluation of their Insecticidal Activities.	*Natural Product Communications*, 2015*, 10,* 1525-1528.
50	Soumitra Agasti, **Upendra Sharma**, Togati Naveen, Debabrata Maiti	Orthogonal Selectivity with Cinnamic Acids in 3-substituted Benzofuran Synthesis through C–H Olefination of Phenols.	*Chemical Communication*, 2015, *51*, 5375.
49	**Upendra Sharma**, Rajesh Kancherla Togati Naveen, Soumitra Agasti, Debabrata Maiti	Palladium-Catalyzed Annulation of Diarylamines with Olefins through C–H Activation: Direct Access to N-Arylindoles. *(Highlighted in Synfacts 2015, DOI: 10.1055/s-0034-1379706)*	*Angewandte Chemie International Edition,* 2014, *53*, 11895. *Angewandte Chemie*, 2014, *126*, 12089.
48	**Upendra Sharma**, Yoonsu Park, Sukbok Chang	Rh(III)-Catalyzed Traceless Coupling of Quinoline *N*-Oxides with Internal Diarylalkynes.	*The Journal of Organic Chemistry*, 2014, *79*, 9899-9906.
47	Mayanka Walia, **Upendra Sharma**, Vijai K. Agnihotri, Bikram Singh	Silica-Supported Boric Acid Assisted Conversion of Mono- and Poly-saccharides to 5-	*RSC Advance*, 2014, *4*, 14414.

		Hydroxymethylfurfural in Ionic Liquid.	
46	Soham Maiti, Togati Naveen, **Upendra Sharma**, Debabrata Maiti	Efficient and Stereoselective Nitration of Olefins with $AgNO_2$ and TEMPO. *(Invited Synpact article)*	*Synlett*, 2014, *25*, 603.
45	Praveen K. Verma, Manju Bala, Kavita Thakur, **Upendra Sharma**, Neeraj Kumar and Bikram Singh	Iron and Palladium (II) Phthalocyanines as Recyclable Catalysts for Reduction of Nitroarenes.	*Catalysis Letter*, 2014, *144*, 1258.
44	Ashun Chaudhary, **Upendra Sharma**, Adrah. Pal Vig, Bikram Singh, Saroj Arora	Free radical scavenging, antiproliferative activities and profiling of variations in the level of phytochemicals in different parts of broccoli (*Brassica oleracea* italica).	*Food Chemistry*, 2014, *148*, 373.
43	Vishal Kumar, **Upendra Sharma**, Praveen Kumar, Neeraj Kumar, Bikram Singh	Silica-supported Boric Acid Catalyzed Synthesis of Dihydropyrimidin-2-ones, Bis(indolyl)methanes, Esters and Amides.	*Indian Journal of Chemistry Section – B,* 2014, *53B*, 83.
42	**Upendra Sharma**, Togati Naveen, Arun Maji, Srimanta Manna, Debabrata Maiti	Palladium Catalyzed Synthesis of Benzofurans and Coumarins from Phenols and Olefins. *(Most Accessed Paper in October, 2013)*	*Angewandte Chemie International Edition.* 2013, *52*, 12669. *Angewandte Chemie* 2013, *125*, 12901.
41	Soham Maiti, Togati Naveen, **Upendra Sharma**, Debabrata Maiti	Stereoselective Nitration of Olefins with tBuONO and TEMPO: Direct Access to Nitroolefins under Metal-free Condition. *(Highlighted by Organic Chemistry Portal 2013 (http://www.organicchemistry.org/abstracts/lit4/087.shtm)*	*Organic Letter*, 2013, *15*, 3384.
40	Togati Naveen, Soham Maiti, **Upendra Sharma**, Debabrata Maiti	A Predictably Selective Nitration of Olefin with $Fe(NO_3)_3$ and TEMPO. *(Highlighted in Organic Process Research & Development 2013, 17, 1076−1084; Organic Chemistry Portal 2013 (http://www.organic-chemistry.org/abstracts/lit4/062.shtm)*	*The Journal of Organic Chemistry*, 2013, *78*, 5949.
39	Tuhin Patra, Arghau. Deb, Srimanta Manna, **Upendra Sharma**, Debabrata Maiti	Iron-Mediated Decarboxylative Trifluoromethylation of *α,β*-Unsaturated Carboxylic Acids with	*European Journal of Organic Chemistry*, 2013, *24*, 5257.

		Trifluoromethanesulfinate. (*Highlighted in Organic Process Research & Development 2013, 17, 1369-1379)*	
38	Manju Bala, Praveen Kumar Verma, **Upendra Sharma**, Neeraj Kumar, Bikram Singh	Iron Phthalocyanine as an Efficient and Versatile Catalyst for N-alkylation of Heterocyclic Amines with Alcohols: One-pot Synthesis of 2-Substituted Benzimidazoles, Benzothiazoles and Benzoxazoles.	*Green Chemistry* 2013, *15*, 1687.
37	Shunmugam. Nagarajan, Syamantak. Majumder, **Upendra Sharma**, Saranya Rajendran, Neeraj Kumar, Suvro Chatterjee, Bikram Singh	Synthesis and anti-angiogenic activity of benzothiazole, benzimidazole containing phthalimide derivatives.	*Bioorganic Medicinal Chemistry Letters*, 2013, *13*, 287.
36	Praveen K. Verma, **Upendra Sharma**, Manju Bala, Neeraj Kumar, Bikram Singh	Transition Metal-free 1,3-Dimethylimidazolium Hydrogen Carbonate Catalyzed Hydration of Organonitriles to Amides.	*RSC Advance*, 2013, *3*, 895.
35	Manoj Kumar, **Upendra Sharma**, Sushila Sharma, Vishal Kumar, Bikram Singh, Neeraj Kumar	Catalyst-Free Water Mediated Reduction of Nitroarenes Using Glucose as Hydrogen Source.	*RSC Advance*, 2013, *3*, 4894.
34	Manju Bala, Praveen Kumar Verma, Neeraj Kumar, **Upendra Sharma**, Bikram Singh.	Highly Efficient Iron Phthalocyanine Catalysed Oxidative Synthesis of Imines from Alcohols and Amines. *(Most downloaded articles of the from May to November, 2013)*	*Canadian Journal of Chemistry*, 2013, *91*, 732.
33	Praveen K. Verma, Neeraj Kumar, **Upendra Sharma**, Manju Bala, Vishal Kumar, Bikram Singh	Transition Metal-Free Sodium Borohydride Promoted Controlled Hydration Of Nitriles To Amides.	*Synthetic Communication*, 2013, *43*, 2867.
32	**Upendra Sharma**, Neeraj Kumar, Bikram Singh, Renuka K. Munshi and Supriya. Bhalerao	Immunomodulatory Active Steroidal Saponins from *Asparagus racemosus*.	*Medicinal Chemistry Research*, 2013, *22*, 573.
31	Deepali Katoch, Dharmesh Kumar, **Upendra Sharma**, Neeraj Kumar, Yogendra S. Padwad, Brij Lal, Bikram Singh	Zephgrabetaine: A New Betaine-type Amaryllidaceae Alkaloid from *Zephyranthes grandiflora*.	*Natural Product Communications*, 2013, *8*, 161-164.
30	Manyaka Walia, **Upendra Sharma**, Sashi Bhushan, Neeraj Kumar, Bikram Singh	Arabinan-type Polysaccharides from Industrial Waste Apple Pomace.	*Chemistry of Natural compounds*, 2013, *49*, 794.
29	**Upendra Sharma**, Deepali.	Synthesis, Antibacterial and	*Indian Journal of*

	Katoch, Swati. Sood, Neeraj Kumar, Bikram Singh, Archana Thakur, Arvind Gulati	Antifungal activity of 2-Amino-1,4-Naphthoquinones Using Silica-Supported Perchloric Acid ($HClO_4$-SiO_2) as a Mild, Recyclable and Highly Efficient Heterogeneous Catalyst.	*Chemistry Section – B,* 2013, *52B*, 1431.
28	Chitra Singh, Vishal Kumar, **Upendra Sharma**, Neeraj Kumar, Bikram Singh	Recent Advances in the Synthesis of Amide.	*Current Organic Synthesis,* 2013, *10*, 241.
27	**Upendra Sharma**, Neeraj Kumar, Praveen K. Verma, Vishal Kumar, Bikram Singh	Zinc Phthalocyanine with PEG-400 as A Recyclable Catalytic System for Selective Reduction of Aromatic Nitro Compounds.	*Green Chemistry* 2012, *14*, 2289.
26	**Upendra Sharma**, Manju Bala, Neeraj Kumar, Bikram Singh, Renuka K. Munshi, Supriya Bhalerao	Immunomodulatory Active Compounds from *Tinospora cordifolia*.	*Journal of Ethnopharmacology,* 2012, *141*, 918.
25	**Upendra Sharma**, Manju Bala, Rikki Saini, Praveen K. Verma, Neeraj Kumar, Bikram Singh, Renuka K. Munshi, Supriya Bhalerao	Polysaccharide Enriched Immunomodulatory Fractions from *Tinospora cordifolia.*	*Indian Journal of Experimental Biology,* 2012, *50*, 612.
24	**Upendra Sharma**, Neeraj Kumar, Bikram Singh.	New Furostanol Saponin and Phenyl Propanoid from Roots of *Asparagus racemosus.*	*Natural Product Communications* 2012, *7*, 995-998.
23	Vishal Kumar, Sushila Sharma, **Upendra Sharma**, Bikram Singh, Neeraj Kumar	Synthesis of Substituted Amines and Isoindolinones: Catalytic Reductive Amination using Abundantly Available $AlCl_3$/PMHS.	*Green Chemistry* 2012, *14*, 3410.
22	Vishal Kumar, **Upendra Sharma**, Praveen K. Verma, Neeraj Kumar, Bikram Singh	Cobalt(II) Phthalocyanine Catalyzed Highly Chemoselective Reductive Amination of Carbonyl Compounds in a Green Solvent.	*Advanced Synthesis & Catalysis,* 2012, *354*, 870.
21	Ashun Chaudhary, Geetanjli Rampal, **Upendra Sharma**, Tarunpreet Singh Thind, Bikram Singh, A. P. Vig, Saroj Arora	Anticancer, antioxidant activities and GC-MS analysis of glucosinolates in two cultivars of broccoli.	*Medicinal Chemistry & Drug Discovery* 2012, *2*, 30.
20	Madhu Chandel, **Upendra Sharma**, Neeraj Kumar, Bikram Singh, Satwinderjeet Kaur	Antioxidant Activity and Identification of Bioactive Compounds from Leaves of *Anthocephalus cadamba* by Ultra-Performance Liquid Chromatography/Electrospray Ionization Quadrupole Time of Flight Mass Spectrometry.	*Asian Pacific Journal of Tropical Medicine,* 2012, 977.
19	Vishal Kumar, **Upendra**	Direct One-Pot Cobalt(II)	*Australian Journal*

	Sharma, Bikram Singh, Neeraj Kumar	Phthalocyanine Catalyzed Synthesis of *N*-Substituted Isoindolinones.	*of Chemistry*, 2012, *65*, 1594.
18	Praveen Kumar Verma, **Upendra Sharma**, Neeraj Kumar, Manju Bala, Vishal Kumar, Bikram Singh	Nickel Phthalocyanine Assisted Highly Efficient and Selective Carbonyl Reduction in Polyethylene Glycol-400.	*Catalysis Letter,* 2012, *142*, 907.
17	Neeraj Kumar, **Upendra Sharma**, Chitra Singh, Bikram Singh	Thalidomide: Chemistry, Therapeutic Potential and Oxidative Stress Induced Teratogenicity.	*Current Topics in Medicinal Chemistry,* 2012, *12*, 1436.
16	**Upendra Sharma**, Praveen Kumar Verma, Neeraj Kumar, Vishal Kumar, Manju Bala, Bikram Singh	Phosphane-Free Green Protocol for Selective Nitro Reduction with Iron Based Catalyst.	*Chemistry: A European Journal*, 2011, *17*, 5903.
15	Vishal Kumar**, Upendra Sharma**, Praveen Kumar, Neeraj Kumar, Bikram Singh	Silica-Supported Boric Acid with Ionic Liquid: A Recyclable and Green Catalytic System for One-Pot Three-Component Mannich Reaction.	*Chemical & Pharmaceutical Bulletin*, 2011, *59*, 639.
14	Rajbir Kaur, **Upendra Sharma**, Bikram Singh Saroj Arora	Antimutagenic and Antioxidant Characteristics of *Chukrasia tabularis* A. Juss. Extracts.	*International Journal of Toxicology*, 2011, *30*, 21.
13	Rajbir Kaur, **Upendra Sharma**, Bikram Singh Saroj Arora	Antimutagenic Potential of Chickrassy (*Chukrasia tabularis A. Juss*) bark.	*Journal of Medicinal Plants Research,* 2011, *5*, 5021.
12	**Upendra Sharma**, Praveen K.Verma, Neeraj Kumar, Vishal Kumar, Bikram Singh	Highly Chemo- and Regioselective Reduction of Aromatic Nitro Compounds Catalyzed by Recyclable Copper(II) as well as Cobalt(II) Phthalocyanine.	*Advanced Synthesis & Catalysis*, 2010, *352*, 1834.
11	**Upendra Sharma**, Praveen Kumar, Neeraj Kumar, Bikram Singh	Recent Developments in the Chemistry of Phthalimide Derivatives and Their Role as TNF-α Inhibitor.	*Mini Review in Medicinal Chemistry*, 2010, *10*, 678.
10	**Upendra Sharma**, Pamita Bhandari, Neeraj Kumar, Bikram Singh	Simultaneous Determination of Ten Sugars in *Tinospora cordifolia* by Ultrasonic Assisted Extraction and HPLC-ELSD Method.	*Chromatographia*, 2010, *71*, 633.
9	**Upendra Sharma**, Manju Bala, Praveen K Verma, Geetanjli. Rampal, Neeraj Kumar, Bikram Singh, Saroj Arora	Antimutagenic Extract from *Tinospora cordifolia* and its Chemical Composition.	*Journal of Medicinal Plants Research*, 2010, *4*, 2488.
8	**Upendra Sharma***	Silica Supported Perchloric Acid ($HClO_4$-SiO_2): A Versatile Reagent in	*Synlett*, No. 2009, *19*, 3219.

		Organic Synthesis.	
7	**Upendra Sharma**, Rikki Saini, Bobita, Neeraj Kumar, Bikram Singh	Steroidal Saponins from *Asparagus racemosus.*	*Chemical & Pharmaceutical Bulletin,* 2009, *57*, 890.
6	Ritu Bala, Raj Pal Sharma, **Upendra Sharma**, Andrew D. Burrows, Kevin Cassar	Hexaamminecobalt(III) Complexes as Multiple Hydrogen Bond Donors: Synthesis, Characterization and X-ray Structural Study of Mixed Anion Complexes $[Co(NH_3)_6]Br_2(BF_4)$ and $[Co(NH_3)_6]Cl_2(HC_2O_4).H_2O$.	*Journal of Molecular Structure*, 2007, *832*, 156.
5	Ritu Bala, Raj Pal Sharma, **Upendra Sharma**, Veleria Ferretti	The First X-ray Structure of a Hexaamminecobalt(III) Salt with Two Different Complex Chlorocadmium Anions: Synthesis, Characterization and Crystal Structure of $[Co(NH_3)_6]_4[CdCl_6][CdCl_4(SCN)(H_2O)]_2Cl_2.2H_2O$.	*Acta crystallographica. Section C*, 2006, *62*, m 628.

BOOK CHAPTER

4. **U. Sharma**, A. Modak, S. Maity, A. Maji and D. Maiti. Direct Arylation *via* C-H activation. Thomas Colacot eds., *Introduction to New Trends in Cross-Coupling: Theory and Applications*. 2014.
3. M. Chandel, **U. Sharma**, N. Kumar, B. Singh and S. Kaur. In Vitro Studies on the Antioxidant/Antigenotoxic Potential of Aqueous Fraction from *Anthocephalus cadamba* Bark. P.R. Sudhakaran *et al.* (eds.), *Perspectives in Cancer Prevention-Translational Cancer Research*, 2013, DOI 10.1007/978-81-322-1533-25.

PATENT

2. B. Singh, S. Chattergi, N. Kumar and **U. Sharma**. Benzothiazole Substituted Phthalimide Analogues as Potential Angiogenesis Inhibitors. Ref. No. 0918 DEL 2011.
1. **U. Sharma**, N. Tagoti, and D. Maiti. Palladium-Catalyzed Synthesis of Benzofurans and Coumarins from Phenols and Olefins. Status: Provisional. IPA No: 2012/Mum/2013.

PAPER PRESENTED IN CONFERENCE

Invited/Oral Presentations

2018

1. "**Quinoline Functionalization via C-H Bond Activation: Synthesis of Anti-malarial Quinolines**" in International Conference on Organometallics and Catalysis (ICOC 2018) Holiday Inn Resort, Goa, India during December 13-16, 2018.
2. "Herbal Material: Basic Research and Issue of Contamination" in two Week Intensive Course on "**Recent Trends and Challenges in Regulation and Standardization of Herbal Drugs and Formulations**" organised by NIPER-SAS Nagar, 06-16 August 2018.

2017

3. **"Quinoline Functionalization through Remote C-H Activation Using Traceless Directing Group**" in Contemporary Facets in Organic Chemistry Synthesis (CFOS) 2017, IIT Roorkee, Uttarakhand, 22-24 December, 2017.

4. **"Medicinal Plant Processing: Novel Bioactive Molecules"** in Scenario of Medicinal Plants in Himalayan Region-Cultivation, Processing and Marketing, CSIR-IHBT, Palampur, India. Organised by State Medicinal Plants Board, Himachal Pradesh, Ayurveda Bhawan, SDA Complex, Kasumpti, Shimla on 10-11 October, 2017.

5. **"Traditional Knowledge: A Perfect Guide for the Discovery of Novel Bioactive Molecules"** in Seventh Euro-India International Conference on Holistic Medicine (ICHM-2017), Kottayam, Kerala, India on 15-17 September 2017.

6. "**Future Affordable Medicines: Efforts Towards Novel Bioactive Molecules**" in Multidisplinary National Conference on Innovative Trends in Science, Technology and Management-IV on 24th August, 2017 Organised by Sri Sai University, Palampur, Himachal Pradesh.
7. "**Efforts Towards Characterization of Bioactive Molecules from Medicinal Plants**" 4th International Congress of the Society for Ethnopharmacology, India Healthcare in 21st century: Perspectives of Ethnopharmacology & Medicinal Plant Research, UKA Tassadia University, Bardoli, Surat, Gujrat on February 23-25, 2017.
   (Manjushree Pal Memorial Award for Best Presentation from Ethanopharmacology Society of India, Kolkata)

2016

8. "**Phytochemical Investigation of *Tinospora cordifolia* and *Asparagus racemosus* for Potential Immunmodulatory Agents**" in Scientific Validation of Traditional knowledge, IIT Rorkee, Uttarakhand on March 12-13, 2016 Organized by MHRD-IPR Chair IIT Roorkee, Uttarakhand

Poster Presentation

2017

1. A. K. Dhiman, S. Chaudhary, R. Kumare, R. Kumar and **U. Sharma**.* Synthesis of 2-substituted-3-(2-hydroxyaryl)quinolines and 4-(2-hydroxyaryl)acridines. in

Contemporary Facets in Organic Chemistry Synthesis (CFOS) 2017, IIT Roorkee, Uttarakhand, 22-24 December, 2017.

2. R. Sharma, R. Kumar, I. Kumar and **U. Sharma**.* $[Cp^*RhCl_2]_2$ Catalyzed Remote Functionalization of Quinolines and their Mechanistic Understanding. ***Indo-US Bilateral Workshop*** Organised by IISc Bangalore, IISER Kolkata and IIT Mumbai at Rhythm Lonavala, Lonavala, Maharashtra, India during December 7-10, 2017.
3. R. Kumar, A. K. Dhiman and **U. Sharma**.* Metal-free C-2 Arylation of Quinoline *N*-Oxides with Aryldiazonium Salts/Anilines. ***21st CRSI National Symposium in Chemistry*** n organised by CSIR-IICT, Tarnaka Hyderabad-500007 on 2017.
4. R. Sharma, I. Kumar, R. Kumar and **U. Sharma*** Rhodium (III)-Catalyzed Remote C-H Activation/functionalization of Quinolines. ***21st CRSI National Symposium in Chemistry*** organised by CSIR-IICT, Tarnaka Hyderabad-500007 on 2017.
5. Onkar S Nayal, M S Thakur, N. Kumar, **U. Sharma*** and B. Singh.* Novel Approches for the Synthesis of Tertiary Amines via Carbocationic Pathway. ***VI National Symposium on Advances in Chemical Science at*** GNDU, Amritsar, Punjab, India on 5-6 March, 2017. ***(Best Poster Award)***

2016

6. R. Sharma, I. Kumar and **U. Sharma**.* Rhodium-catalyzed remote C-H activation using traceless directing group. ***21st International Conference on Organic Chemistry***, IIT Bombay, Bombay, India on 11-16 December, 2016.

7. Rakesh Kumar, Ankit Kumar Dhiman and Upendra Sharma. Catalyst and Solvent Free Access to Bioactive Quinoline Derivatives. ***21st International Conference on Organic Chemistry***, IIT Bombay, Bombay, India on 11-16 December, 2016.

8. M. Kumar, N. Kumar, B. Singh and **U. Sharma**.* Harnessing bio-based reagents for C-N bond formation reactions. ***21st International Conference on Organic Chemistry***, IIT Bombay, Bombay, India on 11-16 December, 2016.

9. S. Sharma, N. Kumar, B. Singh and **U. Sharma**.* Bioactivity to organocatalysis: Introduction of vasicine for C-C bond formation and reduction reaction. ***21st International Conference on Organic Chemistry***, IIT Bombay, Bombay, India on 11-16 December, 2016.

10. A. Chaudhary, **U. Sharma**, A. P. Vig, V. Sharma, B. Singh and S. Arora. Biological and Chemical Investigation of Brassica oleracea L. Var. italica Plenck (Broccoli) at Different Developmental Stage. ***ICEMCH–2016, International Conference on Environmental Mutagenesis, Carcinogenesis and Health and 40th Annual Meeting of Environmental Mutagen Society of India (EMSI)***, GNDU, Amritsar, India on 17-19 February, 2016.

11. M. Chandel, M. Kumar, **U. Sharma**, N. Kumar, B. Singh and S. Kaur. Isolation and Characterization of Phytoconstituents from *Anthocephalus cadamba* (Roxb.) Miq. Leaves with Potent Antioxidant, Antigenotoxic, Antiproliferative and COX-2 Inhibitory Activities. ***ICEMCH – 2016, International Conference on Environmental Mutagenesis, Carcinogenesis and Health and 40th Annual Meeting of Environmental Mutagen Society of India (EMSI)***, GNDU, Amritsar, India on 17-19 February, 2016.

2015 and earlier

12. **U. Sharma**, S. Agasti, T. Naveen and D. Maity. Palladium Catalyzed Selective Synthesis of Substituted Benzofurans from Phenols and Olefins: One-Step Triple C-H Activation. ***16th CRSI National Symposium in Chemistry***. Organised by Chemical Research Society of India at Indian Institute of Technology Bombay, Powai, Mumbai. (**2014**)

13. V. Kumar, **U. Sharma**, P. K. Verma, B. Singh, N. Kumar. Metal Phthalocyanines: Biomimetic Catalysts for Selective and Sustainable Organic Synthesis. ***6th International Conference on Green and Sustainable Chemistry (GSC-6)*** at The University of Nottingham, Nottingham, UK (**2013**).
14. **U. Sharma**, P. K. Verma, V. Kumar, N. Kumar and B. Singh. Highly Chemo- and Regioselective Metal Phthalocyanines Catalyzed Reductions. ***12th Eurasia Conference on Chemical Sciences*** Organised by University of Ioannina at Chandris Hotel, Corfu, Greece. (**2012**)
15. **U. Sharma**, P. K. Verma, V. Kumar, N. Kumar and B. Singh. Metal Phthalocyanines as Efficient Catalysts for Highly Chemo- and Regioselective Organic Transformations. ***3rd Asian Conference on Coordination Chemistry*** Organised by IIT, Kanpur and IIT Delhi at India Habitat Center, New Delhi, India (ACCC-3, **2011**).
16. **U. Sharma**, R. Saini, Bobita, N. Kumar and B. Singh. Diagnostic NMR Signals for Structure Elucidation of Steroidal Saponins from *Asparagus racemosus*. ***17th Conference of National Magnetic Resonance Society*** at GNDU, Amritsar, India (NMRS, **2011**).
17. **U. Sharma**, R. Saini, P. Bhandari, N. Kumar and B. Singh Reversed-Phase HPLC-Evaporative Light Scattering Detection for Determination of Immunomodulatory Sugars in *Tinospora cordifolia*. 2nd National Symposium on Analytical Sciences on ***Analytical Innovations for Process and Technology Development*** organized by Indian Society of Analytical Scientists and IHBT, at IHBT Palampur (**2008**).
18. V. Kumar, **U. Sharma**, P. K. Verma, C. Singh, N. Kumar, and B. Singh. Silica Supported Perchloric Acid (H_3BO_4-SiO_2): A Versatile Reagent for Fundamental Organic Transformations. International Symposium on ***Recent Advances in Chromatography Science and Green Chemistry*** organized by Indian Society of Analytical Scientists at Manav Rachna International University, Faridabad, India (**2012**).
19. V. Kumar, **U. Sharma**, N. Kumar and B. Singh. Structure Elucidation of Diastereomeric Furofuran Lignans of *Zanthoxylum armatum* by NMR Spectroscopy. ***17th Conference of National Magnetic Resonance Society***, GNDU, Amritsar, India (NMRS, **2011**).

RESEARCH SUMMARY

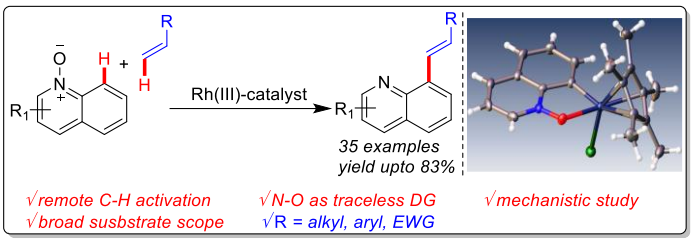
After Independent Lab (2014-Till date)

The research work driven by our group basically gives thrust to the basic science keeping close correlation with future applications. Natural product based novel and bioactive molecules will impute the therapeutic application in modern science. The scientific validation of Ayurveda plants provides scientific basis for their use leading towards high social impact. All our work will open new avenue for the chemical science development. Currently industries are trying to adopt green technologies and our work in the field of catalysis for C-H activation will have huge impact in this area.

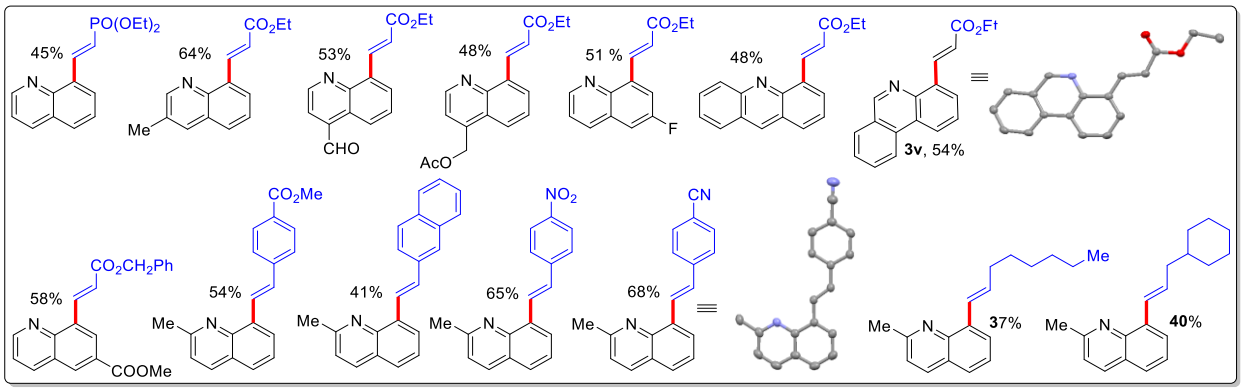
Our group is working towards the synthesis of new quinoline based molecules C-H activation/functionalization.

Rh(III)-Catalyzed Dehydrogenative Coupling of Quinoline *N*-Oxides with Alkenes: *N*-Oxide as Traceless Directing Group for Remote C-H Activation (*Eur. J. Org. Chem.* **2015**, 7519.)

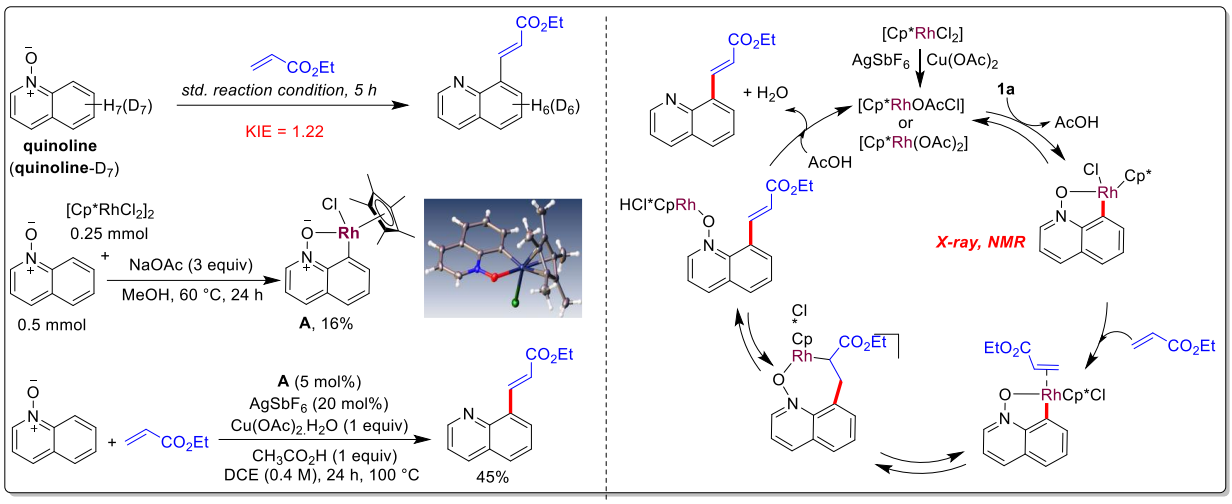
A Rh(III)-catalyzed oxidative dehydrogenative coupling of quinoline N-oxides with alkenes to provide 8-alkenylated quinoline derivatives through remote C-H activation is reported. Main features of the current catalytic method include N-oxide as traceless directing group, high selectivity for C-8 position and broad substrate scope. Mechanistic studies such as isolation and characterization of key five-membered rhodacycle intermediate has also been performed. We have synthesized thirty five new quinoline derivatives via distant C-H activation most of which are new entities.



Selected examples of first time synthasized molecules

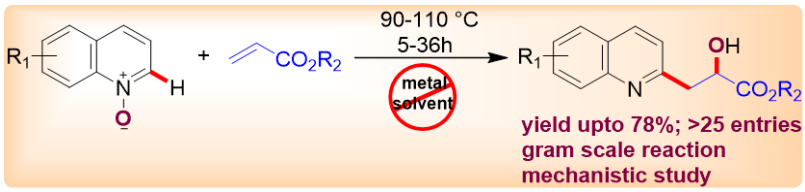


Number of experiments were carried out to understand the pathway of remote C-H activation. Rhodacycle with quinoline *N*-oxide was synthesized for the first time and it is not only helpful in establishing the mechanistic pathway of current reaction but will also be helpful for developing related new transformations.

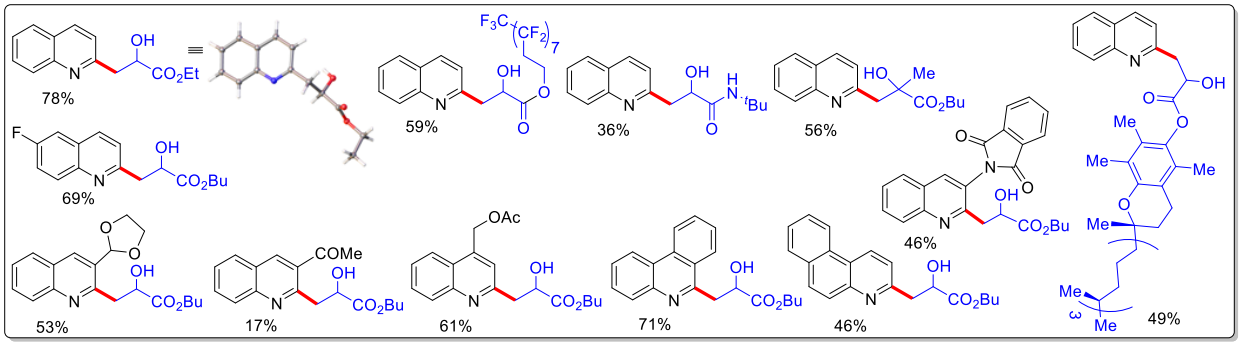


Catalyst and Solvent-Free alkylation of Quinoline N-oxides with Olefins: Direct Access to Quinoline Substituted α–Hydroxy Carboxylic Derivatives *(Org. Bio. Chem.* **2016**, *14,* 2613.*)*

A catalyst/solvent-free, one-pot and operationally simple method for the synthesis of quinoline substituted *α*-hydroxy carboxylic derivatives by hydroxyheteroarylation of olefins with quinoline *N*-oxides is reported. The reaction features high atom-economy, mild and reagent/solvent-free conditions, broad substrate scope and good selectivity with high yields. Preliminary mechanistic study to shed light into the reaction pathway was also carried out.

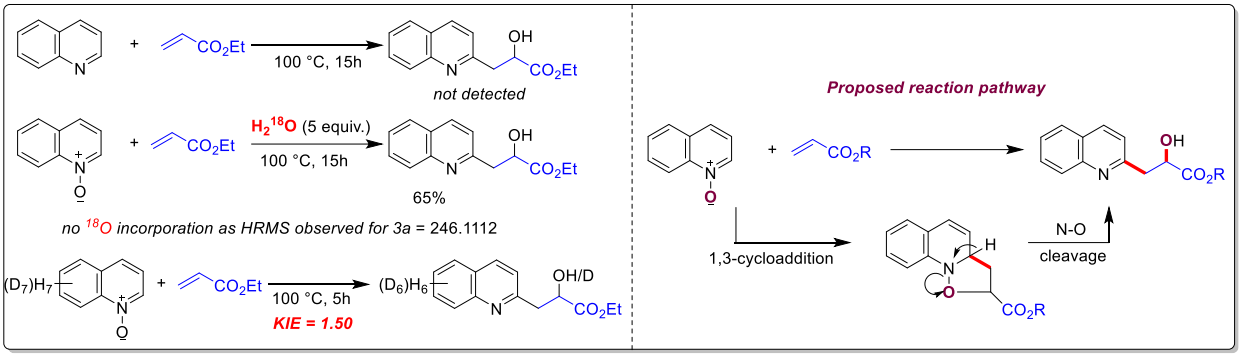


Selected examples of synthasized molecules

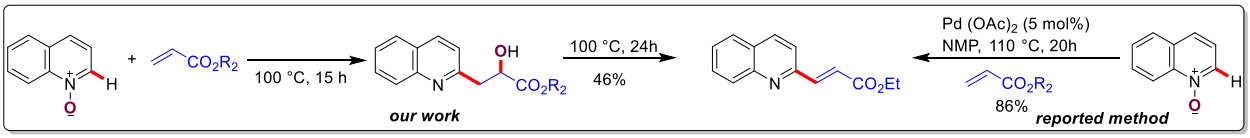


For preliminary understanding of the reaction pathway, few experiments were carried out. Use of quinoline instead of quinoline *N*-oxide failed to provide any product confirming the requirement of later. To probe the O-atom transfer course, standard reaction was carried out in the presence of 99% $H_2{}^{18}O$. HRMS and GC-MS analysis of the isolated product revealed no ^{18}O incorporation, thus suggesting that O-atom transfer is probably intramolecular. Competition experiment between quinoline and the deuterated analogue ***d7-*** quinoline revealed a kinetic isotope effect of $k_H/k_D \approx 1.50$, indicating that the cleavage of C-H bond of quinoline *N*-oxide may or may not be involved in the rate-limiting step. On the basis of these

preliminary mechanistic experiments and literature, a probable mechanistic pathway is depicted. Reaction might involve 1,3-dipolar cycloaddition followed by cleavage of N-O bond to provide the final product.



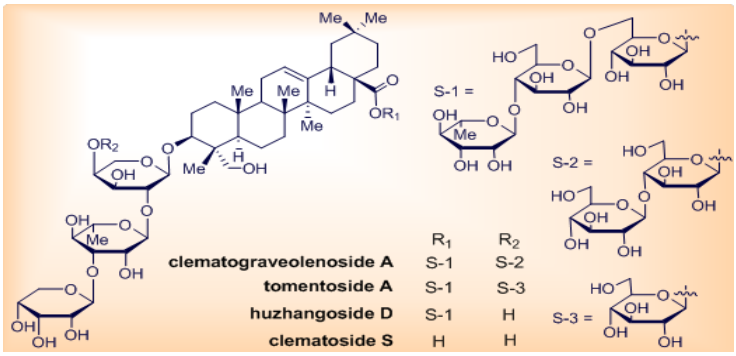
Quinoline substituted *α*–hydroxy carboxylic acid derivatives (**3a)** can be converted into corresponding C-2 olefinated quinoline by simply heating at 100 ^{0}C for 24h without using any additive or solvent albeit in low yield.



Natural Product Chemistry

Phytochemical Investigation of Clematis graveolens *(Nat. Prod. Commun.* **2015***, 10(9),* 1525.*)*

A new hederagenin based triterpenoid saponin, clematograveolenoside A (**1**), along with three known saponins, tomentoside A (**2**), huzhangoside D (**3**) and clematoside S (**4**), were isolated from the roots of *Clematis graveolens*. The structure of new compound was elucidated as *3-O-β-D-ribopyranosyl-(1→3)-α-L-rhamnopyranosyl-(1→2)-[β-D-glucopyranosyl-(1→4)-β-D-glucopyranosyl-(1→4)]-α-L-arabino pyranosyl hederagenin 28-O-α-L-rhamnopyranosyl-(1→4)-β-D-glucopyranosyl-(1→6)-β-D-glucopyranoside* (**1**), on the basis of



detailed analysis of chemical and spectroscopic data including 1D- and 2D NMR. This is the first report for the isolation of tomentoside A (**2**) from this genus and huzhangoside D (**3**) and clematoside S (**4**) from this species. Compound **2** was found more effective against aphid, *Aphis craccivora* with an LC_{50} of 1.21 and 0.46 mg/L at 72 and 96 h after treatment respectively and was followed by compound **4** (LC_{50} = 2.33 and 1.88 mg/L) and **1** (LC_{50} = 3.17

and 2.60 mg/L). In case of termite (*Coptotermis homii*), compound **1** was found more toxic with an LC_{50} of 0.12 mg/L after 24 h of treatment followed by compound **2, 3** and **4** (LC_{50} = 0.13, 0.15 and 0.19 mg/L respectively).

Before Independent Lab (2007-2014)

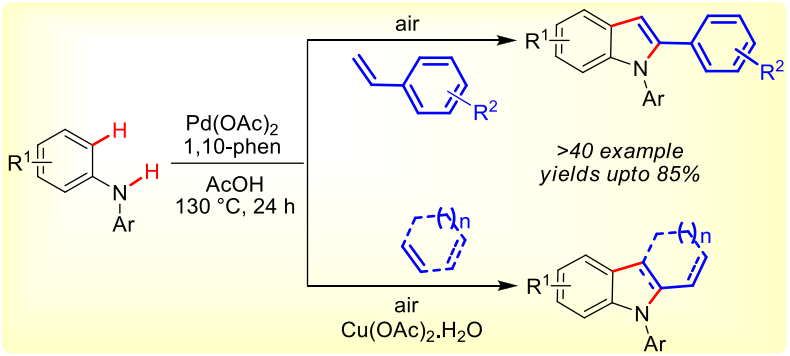
Palladium Catalyzed Synthesis of Indoles through multiple C-H functionalization:

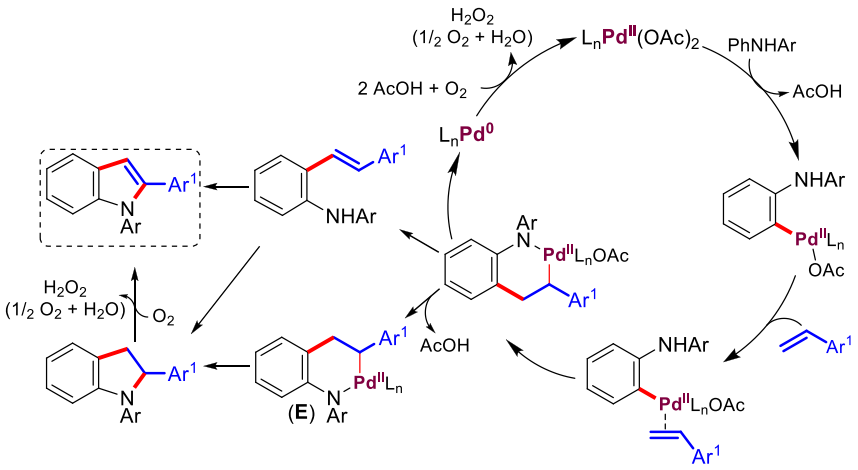
A palladium-catalyzed dehydrogenative coupling between diarylamines and olefins has been discovered for the synthesis of substituted indoles. This intermolecular annulation approach incorporates readily available olefin for the first time and obviates the need of any additional directing group. An *ortho*-palladation, olefin coordination and *β*-migratory insertion sequence has been proposed for the generation of olefinated intermediate, which is found to produce expected indole moiety.

Indole Synthesis

*Upendra Sharma, Rajesh Kancherla, Togati Naveen, Soumitra Agasti and Debabrata Maiti**

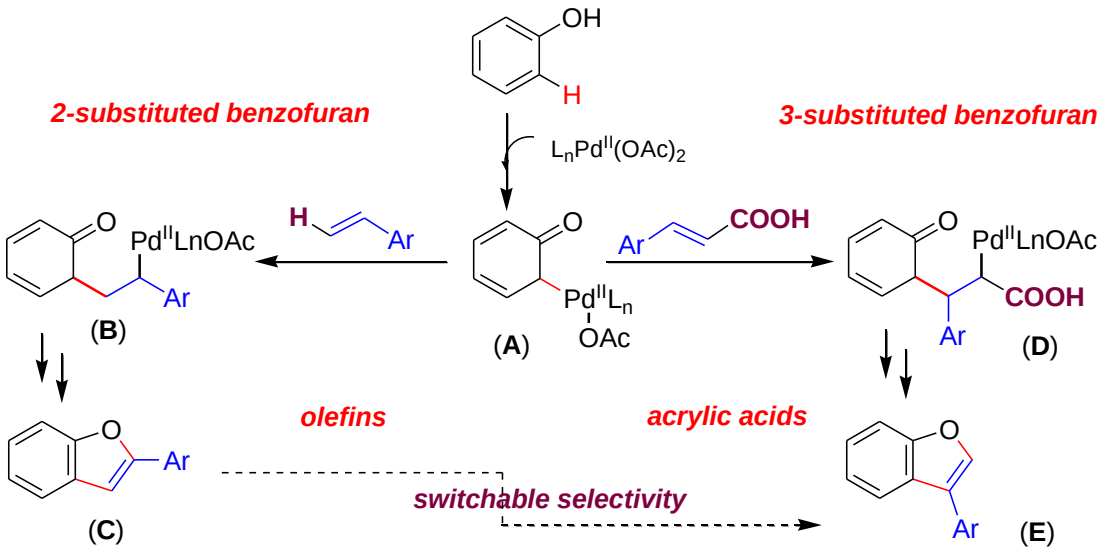
Palladium Catalyzed Annulation of Diarylamines with Olefins through C–H Activation: Direct Access to *N*-Arylindoles





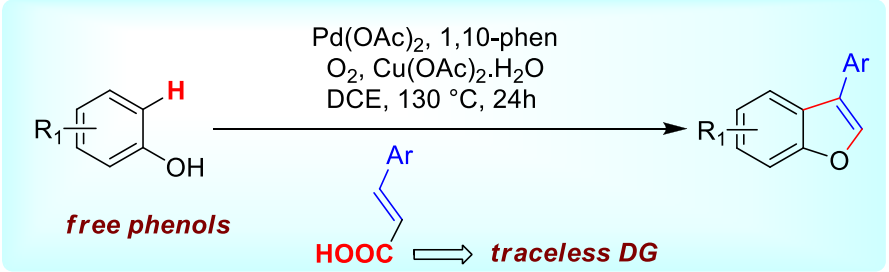
Palladium Catalyzed Synthesis of Benzofurans and Coumarins from Phenols and Olefins:

Idea for Pd Catalyzed inducing switchable selectivity and reactivity



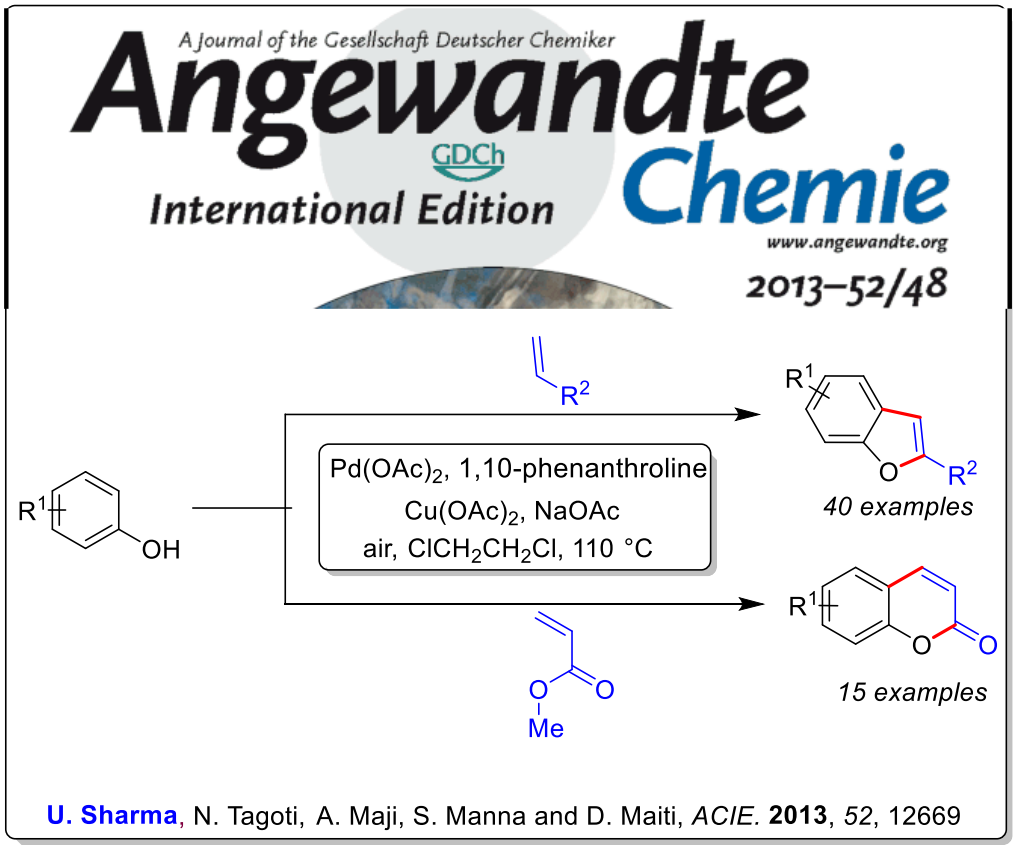
Synthesis of 3-substituted benzofurans through multiple C-H functionalization
(Chem. Commun. **2015**, *51*, 5375)

A palladium catalyzed intermolecular annulation of cinnamic acids and phenols has been achieved for the selective synthesis of 3-substituted benzofurans. Isotope labeling, competition experiments, kinetic studies, and intermediate trapping have supported a sequence of C–C bond formation and decarboxylation followed by the C–O cyclization pathway.

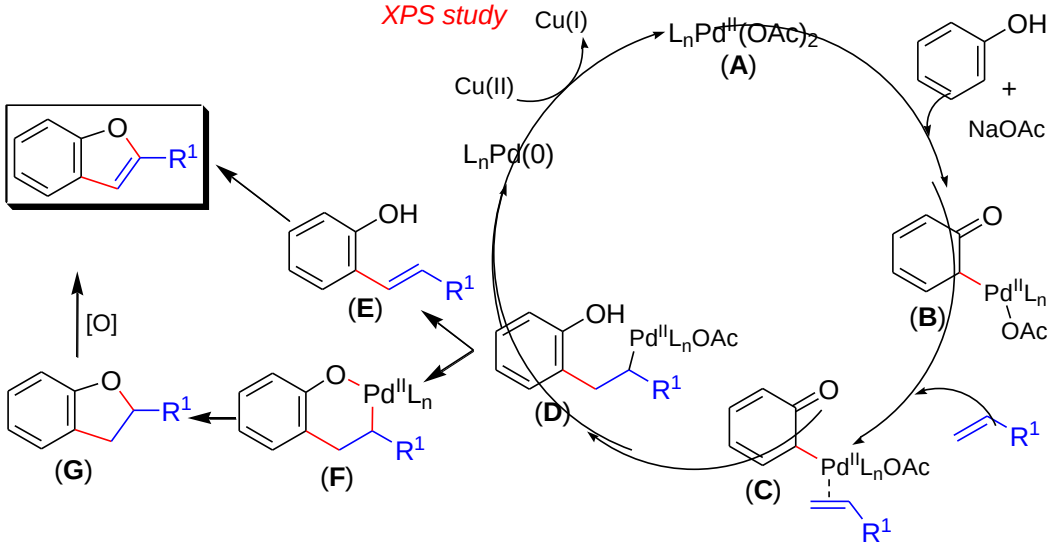


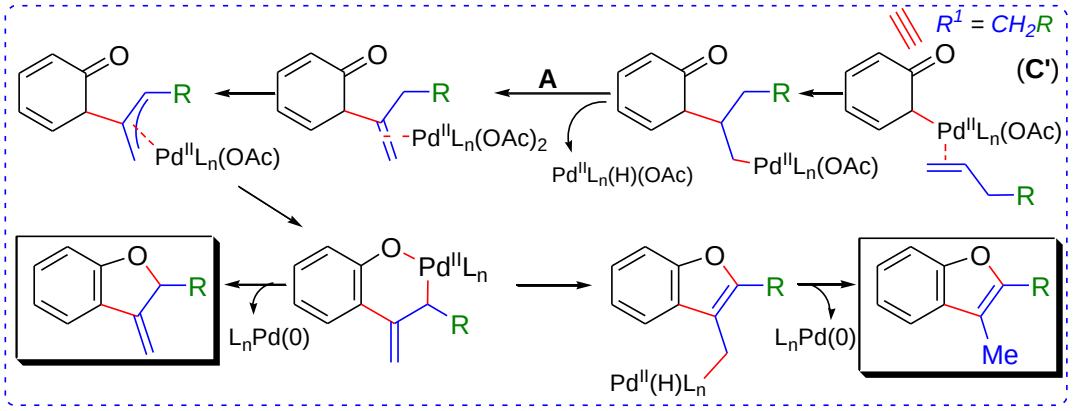
Synthesis of 2-substituted benzofurans through multiple C-H functionalization

Palladium-catalyzed synthesis of benzofurans and coumarins by reacting phenols and unactivated olefins is described. The reaction comprises sequential C-H functionalization and shows diverse functional group compatibility. Preliminary mechanistic studies have been reported to shed light into the possible mechanisms.



Plausible Reaction Pathway



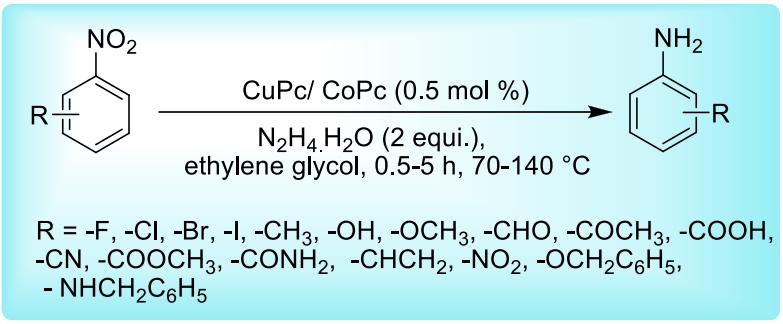


Catalytic Applications of Metal Phthalocyanines

Metal phthalocyanines (MPcs) are stable metal organic complexes that have been extensively employed as catalyst for oxidation and reduction methods. The catalytic potential of MPc is due to their unique property to participate in electron transfer reactions. Their structural similarity with porphyrins like chlorophyll and haemoglobin make them attractive candidates in catalyzing enzyme analogs redox transformations in selective manner. The present work deals with the development of highly selective metal phthalocyanine catalyzed industrially important organic transformations such as nitro reduction to amine, carbonyl reduction to alcohols and reductive amination of carbonyl compounds to corresponding secondary amines. Role of MPc in all these reaction has also been studied.

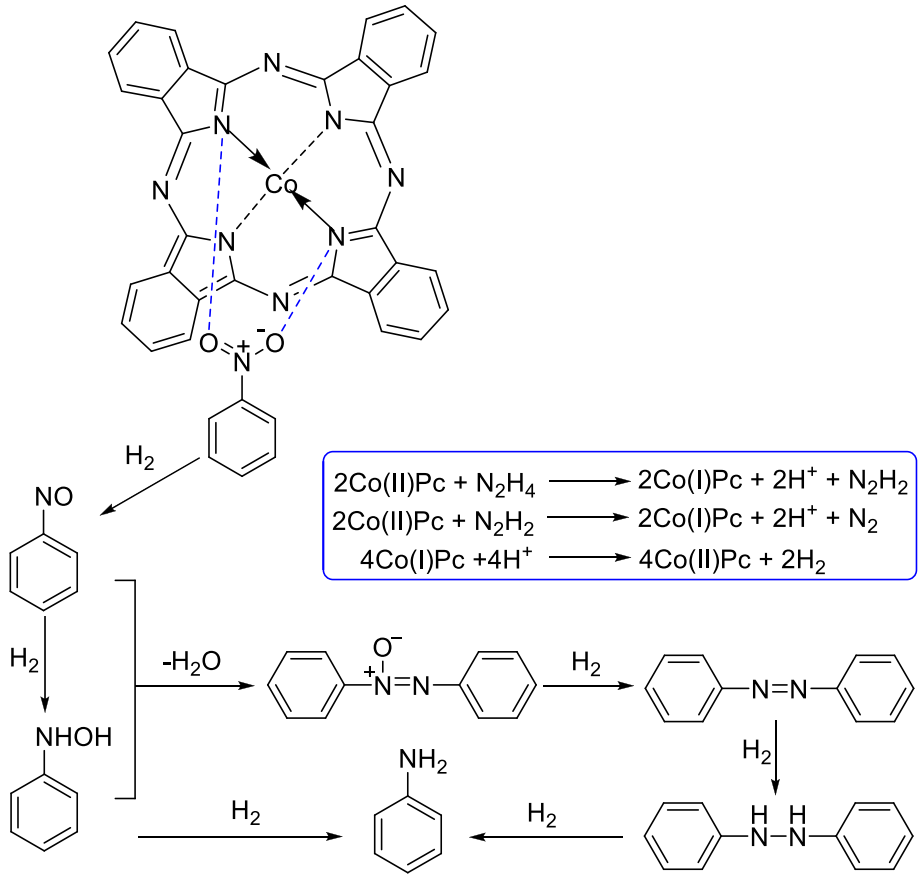
Chemo- and Regioselective Reduction of Aromatic Nitro Compounds Catalyzed by Recyclable Copper(II) as well as Cobalt(II) Phthalocyanine

Copper/cobalt phthalocyanines were first time established as catalyst for very efficient chemo- and regio -selective reduction of aromatic nitro compounds to generate corresponding amines. The selective reduction of nitro compounds were observed in presence of large range of functional groups such as aldehyde, keto, acid, amide, ester, halogen, lactone, nitrile and heterocyclic functional groups.

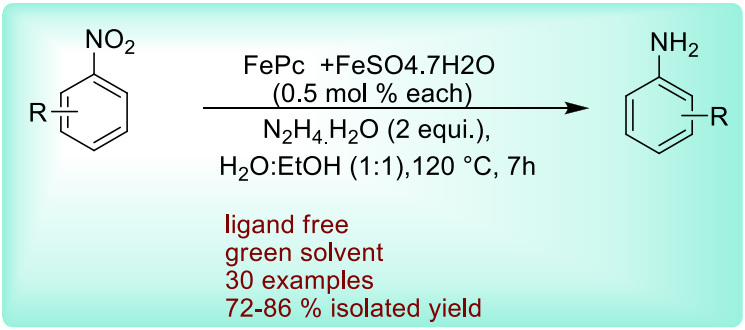


Plausible Mechanism

The reduction mechanism was elucidated by UV-vis and electrospray ionization quadrupole time-of-flight tandem mass spectrometry.

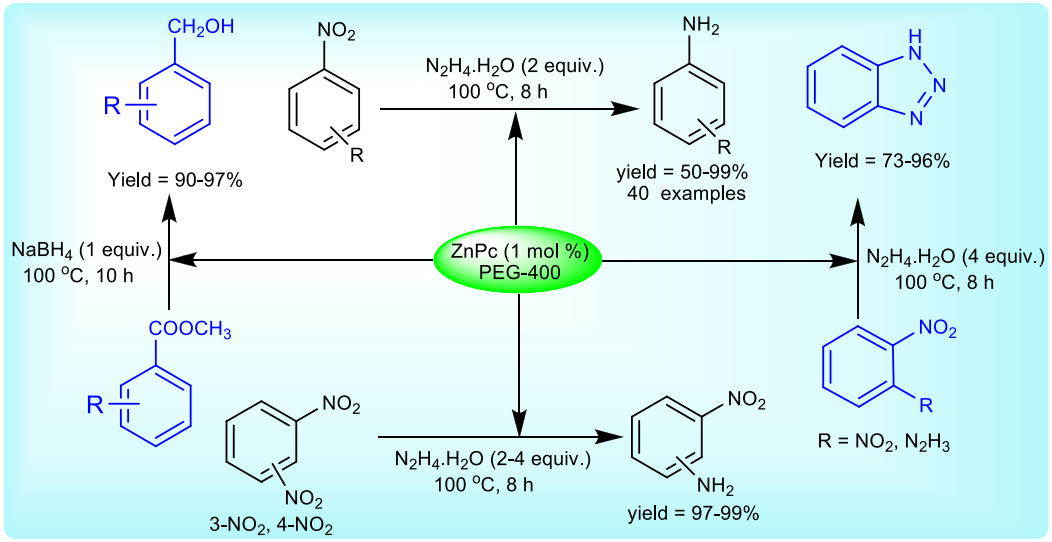


Phosphane-Free Green Protocol for Selective Nitro Reduction with Iron Based Catalyst



Iron phthalocyanine with iron sulphate has been successfully applied for high chemo- and regio -selective reduction of aromatic nitro compounds to corresponding amines in a green solvent system without using any toxic ligand. Present catalytic systems were compatible with other large range of reducible functional groups such as keto, acid, amide, ester, halogen, lactone, nitrile, *N*-benzyl, *O*-benzyl, hydroxy and heterocycles. In the present study dinitro compounds have been regioselectively reduced to corresponding amine with high yield. In most of the cases the conversion and selectivity was > 99% as monitored by GC-MS.

Zinc(II) Phthalocyanine with PEG-400 as a Recyclable Catalytic System for Selective Reduction of Aromatic Nitro and Carbonyl Compounds

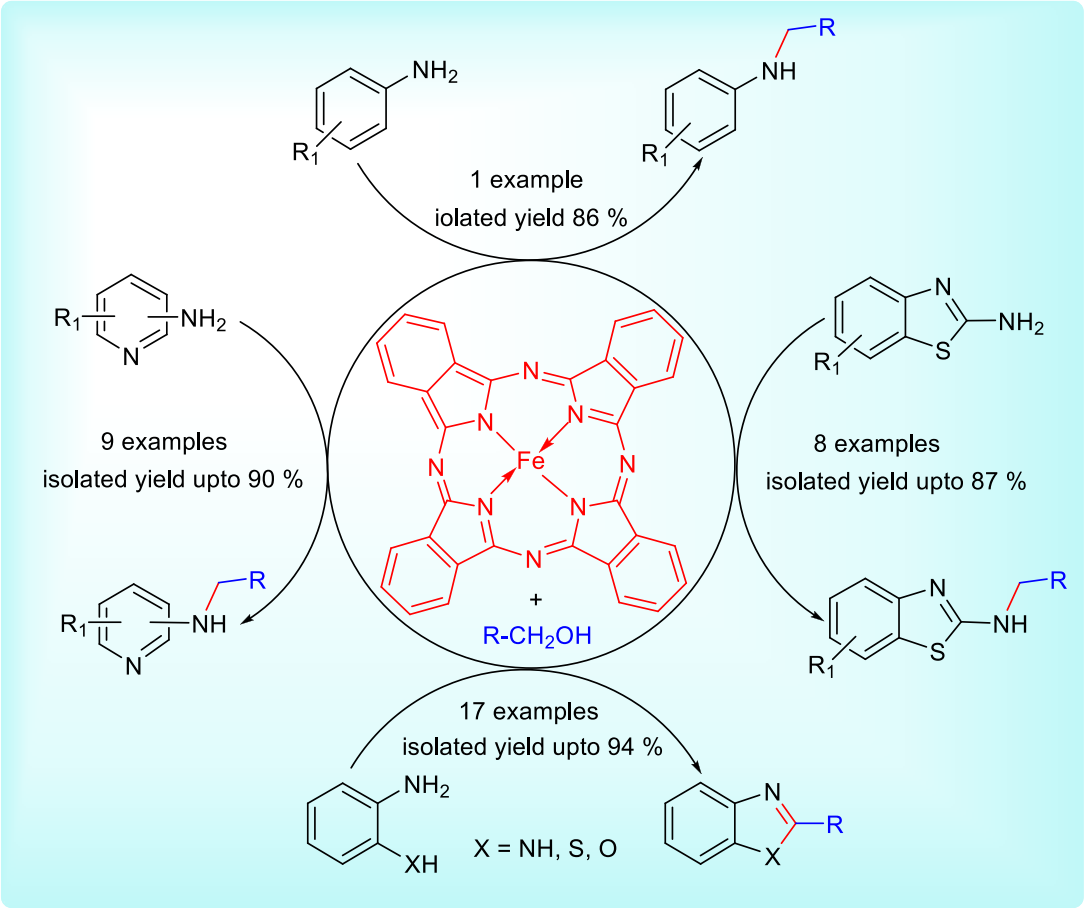


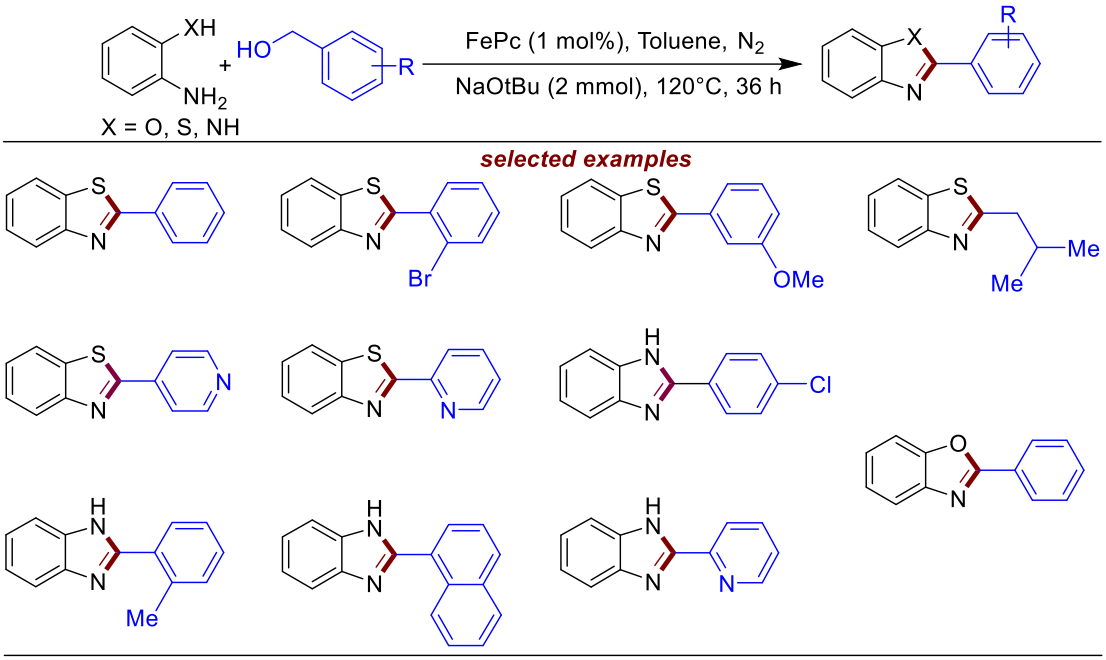
Direct synthesis of benzotriazole form *o*-dinitrobenzene was achieved for the first time. The present catalytic system was successfully employed for reduction of carbonyl and ester compounds to corresponding alcohols and reductive amination of benzaldehydes with primary amines to form corresponding secondary amines. Remarkable advantages of present

catalytic method include low loading of metal, avoidance of toxic ligand and high isolated yields. Catalyst was recyclable up to four times without any loss of selectivity and activity.

Iron Phthalocyanine as an Efficient and Versatile Catalyst for N-alkylation of Heterocyclic Amines with Alcohols: One-pot Synthesis of 2-Substituted Benzimidazoles, Benzothiazoles and Benzoxazoles

An efficient and versatile iron phthalocyanine catalyzed method has been developed for *N*-alkylation of various amines with alcohols. Readily available alcohols were used as the alkylating agents for direct *N*-alkylation of aminobenzothiazoles, aminopyridines and aminopyrimidines. *N*-alkylation of *ortho*-substituted anilines (-NH_2, -SH and –OH) led to the synthesis of 2-substituted benzimidazoles, benzothiazoles and benzoxazoles in one-pot.



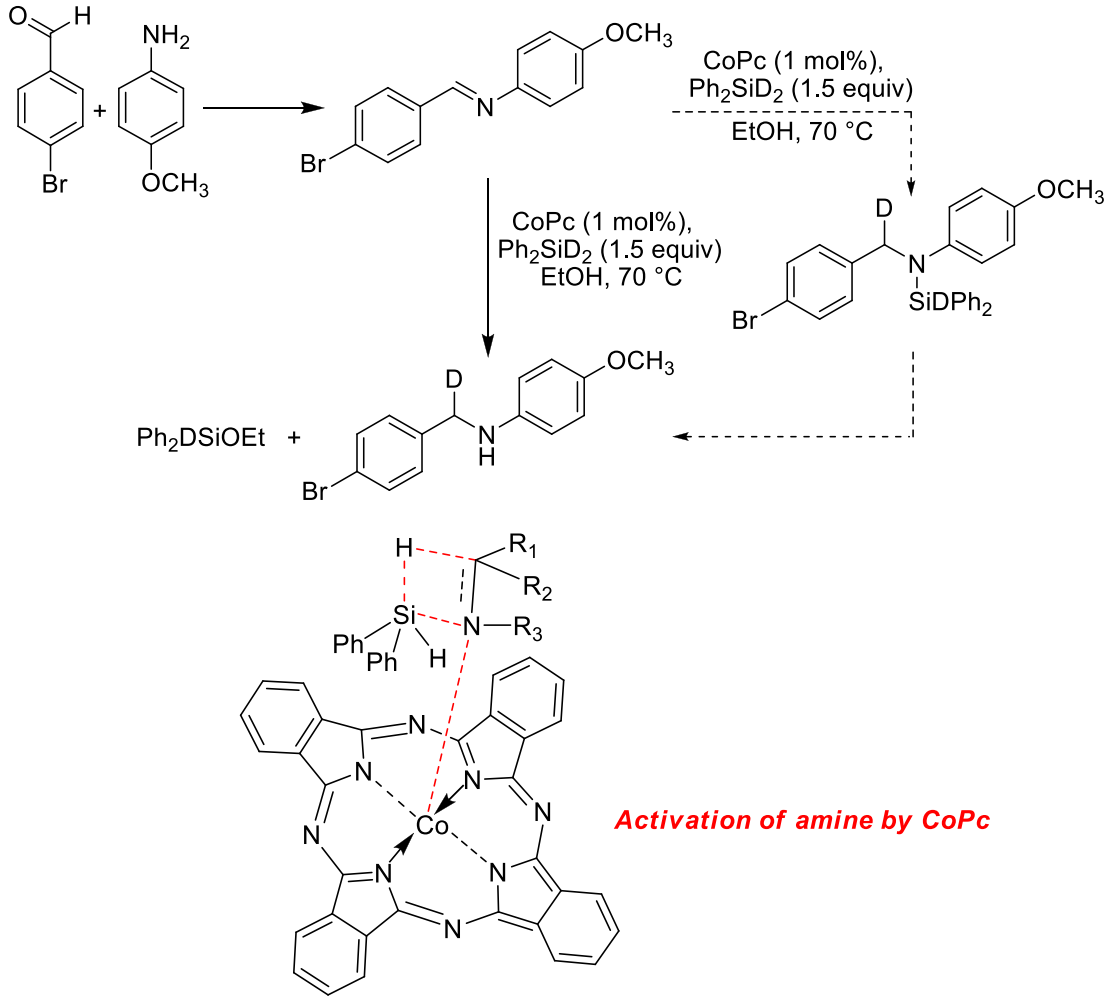


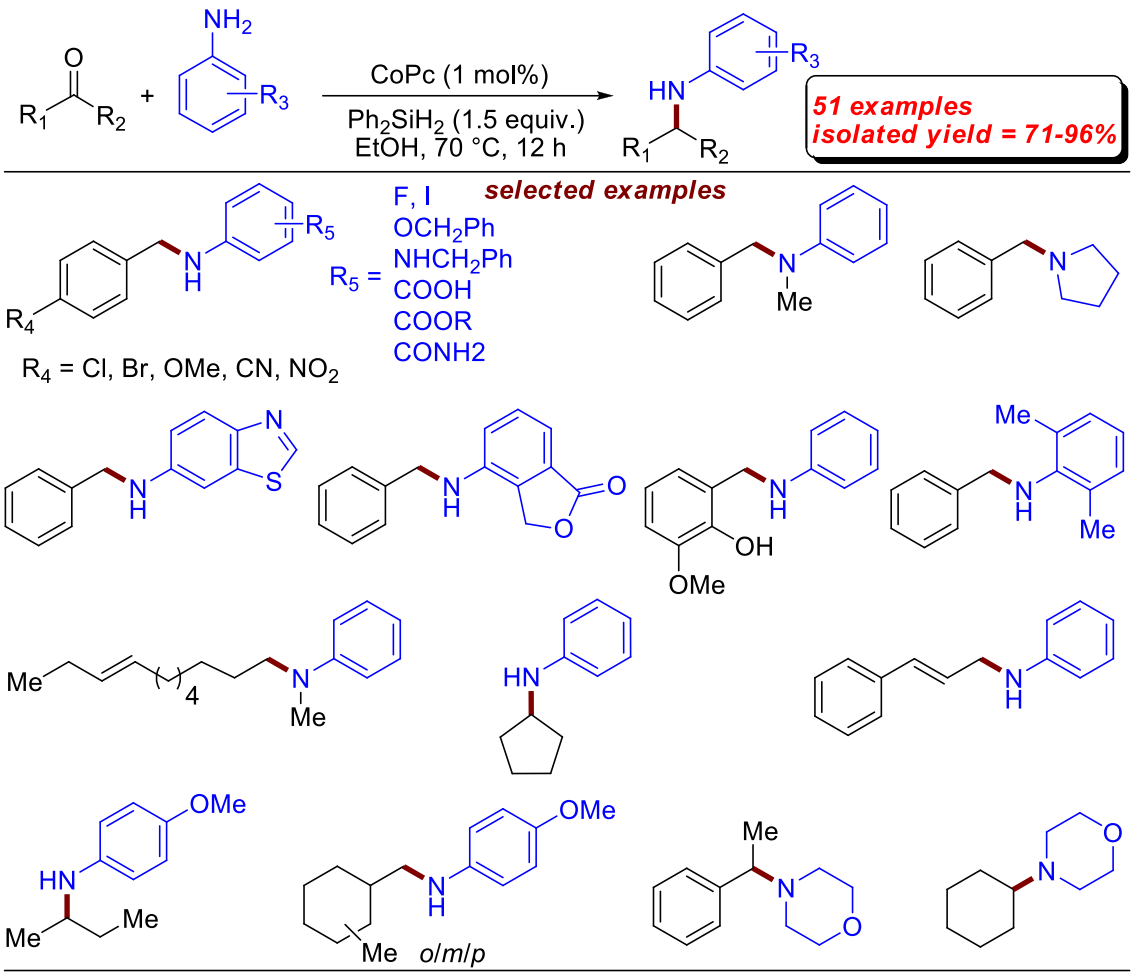
Cobalt(II) Phthalocyanine Catalyzed Highly Chemoselective Reductive Amination of Carbonyl Compounds in ethanol

Cobalt phthalocyanine has been employed for highly chemoselective reductive amination of aldehydes and ketones in a green solvent. A large range of functional groups such as nitro, acid, amide, ester, nitrile, halogen, lactone, methoxy, hydroxy, alkene, *N*-benzyl, *O*-benzyl and heterocyclic functional groups were well tolerated under present reaction conditions. The clear insertion of deuterium on the carbon of the double bond indicated the hydrosilylation of imine to give an intermediate N-silylamine, followed by solvolysis with ethanol or trace amount of water. The formation of diethoxydiphenylsilane as a byproduct confirmed the solvolysis of N-silylamine with ethanol. No change in oxidation state (as monitored by UV-VIS spectrophotometry) and color of CoPc was observed during the reaction that ruled out the involvement of any hydridocobalt species as previously reported. However, the exact role of CoPc is not clear, Lewis acidic character of CoPc might be responsible for imine activation via Lewis acid-base interaction. In order to verify this, a competitive reaction of two imines

having different electronic characters was carried out using standard reaction condition. The higher yield of product was observed from more electron rich imine due to its greater Lewis basic character. This indicated the possible role of Lewis acid-base type interaction in catalyzing the reaction.

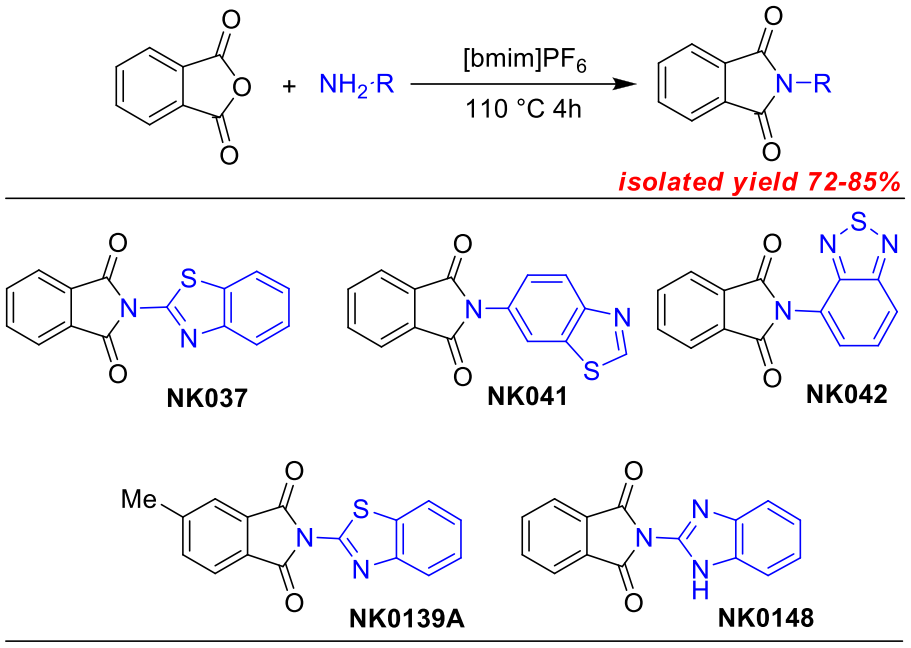
Proposed pathway



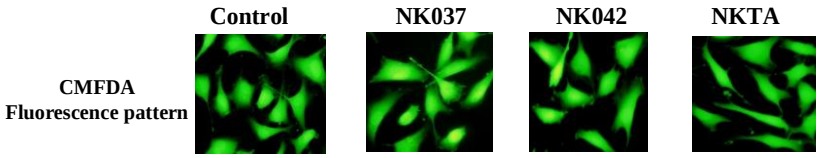


N-Substituted Phthalimide Derivatives as Angiogenesis Inhibitors

Angiogenesis is an important natural process occurring in the body, both in health and disease. The growth and maintenance of solid tumors is highly dependent on neovascularization and can be regulated by compounds that interfere with either the stimulation or proliferation of endothelial cells. As a result, the control of angiogenesis continues to be an attractive area for novel therapeutic agent development. One such agent is thalidomide. Aside from this serious teratogenic effect on the fetus, the drug does have therapeutic value. In addition, thalidomide has significant anti-angiogenic activity. We have synthesized number of phthalimide derivative and evaluated their antiangiogenic activity. During this effort we found two new derivatives which are more active then thalidomide.

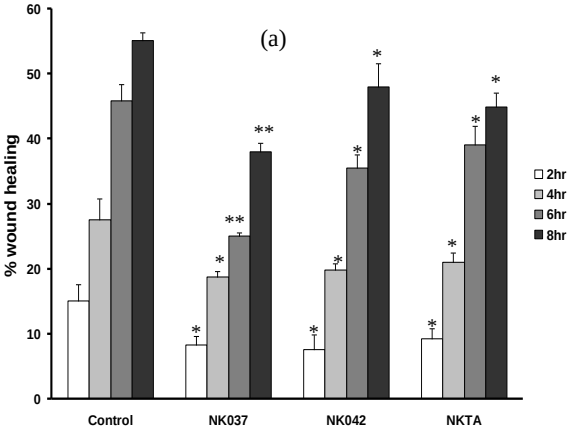


Cell viability



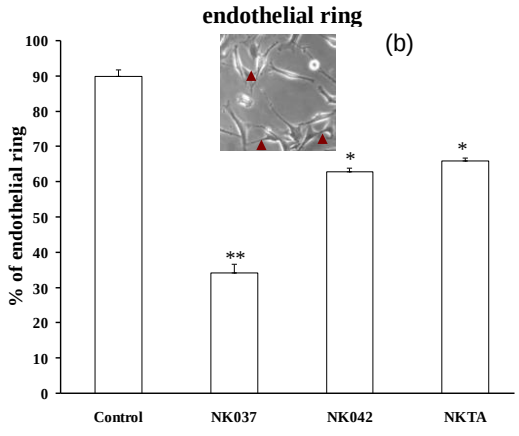
Analogs did not compromisec cellular viability

Comparative study of the analogs using endothelial wound healing model



*P<0.05, **P<0.001 as compare to controll

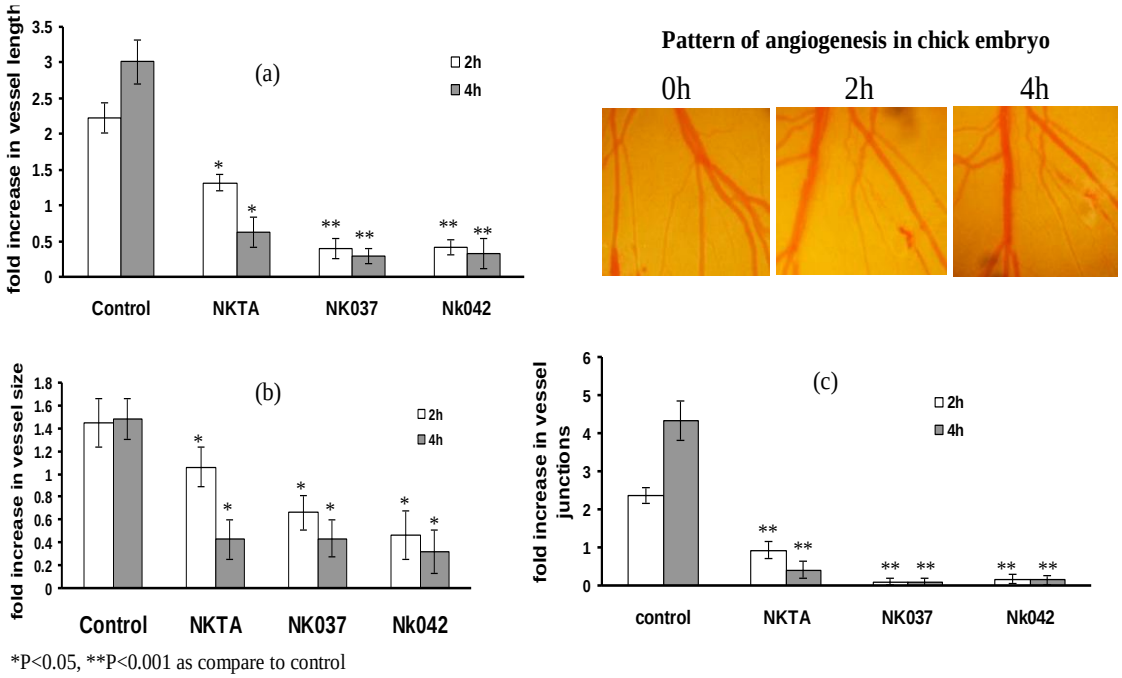
Comparative study of the analogs using endothelial ring formation model



*P<0.05, **P<0.001 as compare to controll

NK037 showed maximum effect on endothelial wound healing and ring formation

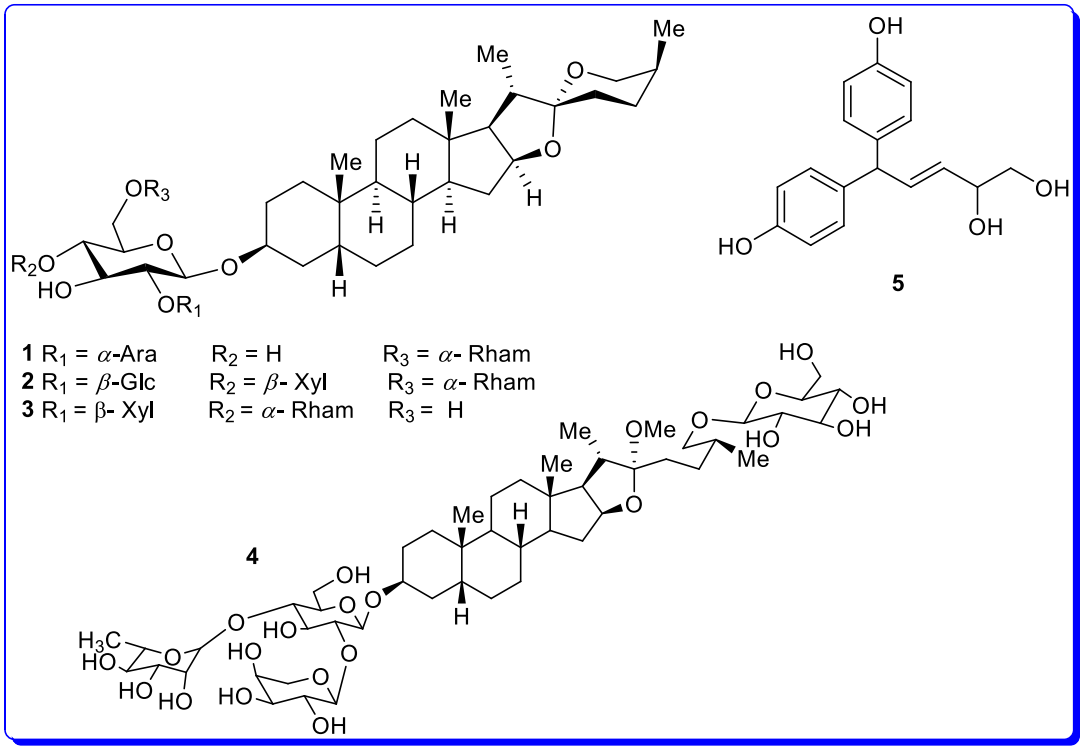
Angiogenesis under the analogs treatment was studied using ex vivo CAM model



*P<0.05, **P<0.001 as compare to control

Characterization of Immunomodulatory Active Secondary Metabolites

Asparagus racemosus

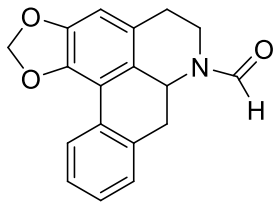


Three novel steroidal saponins, shatavaroside A (**1**), shatavaroside B (**2**) and shatavaroside C (**4**) together with a new diphenylpentendiol, shatavarol (**5**) were isolated from the roots of *A. racemosus*. A known saponin, filiasparoside C(**3**), was first time isolated from this plant. Their

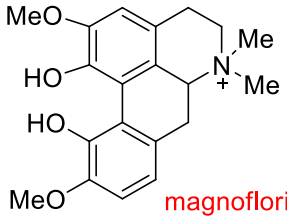
structures were elucidated by 1D and 2D NMR experiments including COSY DEPT, HMQC and HMBC spectroscopy as well as ESI-QTOF-MS/MS analysis. Novel compounds **1** and **2** were found immunostimulator at nano concentration. In addition, five known compounds have also been isolated from the roots of *A. racemosus*.

Tinospora cordifolia

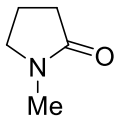
The immunomodulatory activity of different extracts, fractions and isolated compounds in relation to phagocytosis and reactive oxygen species production in human neutrophil cells have been investigated using the PMN phagocytic function studies, NBT, NO and chemiluminescence assay. The results obtained indicate that ethyl acetate, water fractions and hot water extract exhibited significant immunomodulatory activity with an increase in percentage phagocyctosis. Chromatographic purification of these active fractions led to the isolation of a mixture of following compound most of which were found immunomodulatory active



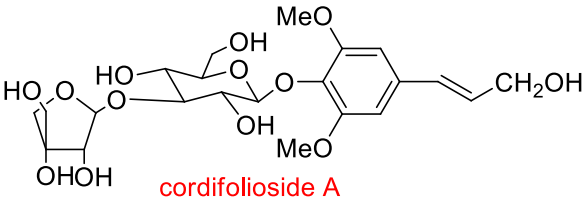
N-formylannonain



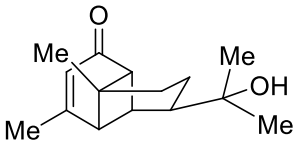
magnoflorine



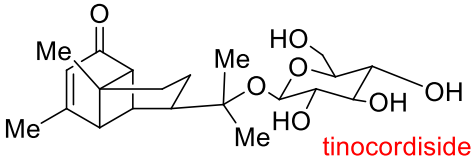
N-methyl-2-pyrolidone



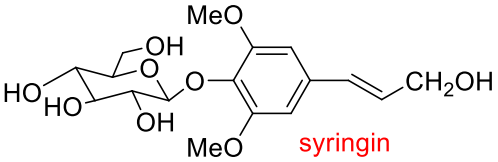
cordifolioside A



11-hydroxy-mustakone



tinocordiside



syringin

(Dr. U. Sharma)