Dr. Yogesh Kumar

Post-Doctoral Research Associate
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Seeking a challenging position in Synthetic Organic Chemistry where my skills can be utilized to the maximum.

WORK EXPERIENCE

February, 2018- present: *Postdoctoral Research Associate,* UNAM-National Nanotechnology Research Center, Department of Chemistry, Bilkent University, Turkey funded by *TUBITAK-BRITISH COUNCIL.*

Highlights:

- Designing and synthesis of fluorescent multi-glycosylated fluorenes, phorphyrins and cucurbiturils based nanocarriers with special focus on the delivery of antigens for vaccination purposes (e.g. cancer or infectious diseases vaccines).
- Develop and implement several new standard operating procedures to combine synthetic organic, supramolecular and polymer chemistry for novel organic and inorganic/organic hybrid, nanostructured functional materials with potential applications in the areas of photonics, photocatalysis, bionanotechnology such as live cell imaging and theranostic nanomedicine, polymeric opto-electronic devices (LEDs, solid state lighting and photovoltaic devices), chemo- and bio-sensors, molecular switches.
- Purification and characterization of organic hybrids using various analytical techniques *viz*. NMR (^{1}H, ^{13}C), 2D NMR (COSY, NOESY, HMBC & HMQC etc.), HPLC, prep-HPLC & Mass spectroscopy (TOF-LCMS/MALDI).
- Utilization of different techniques *viz*. UV-Visible and IR spectroscopy, Fluorescence spectroscopy, DLS (dynamic light scattering) and ZP (zeta potential), Scanning electron microscope (SEM), Brunauer, Emmett and Teller (BET).
- Prepare abstracts, manuscript writing/ editing and other scientific reports as a part of project.
- Presentations at conferences, participate in meetings with research collaborators, assistance to PhD, graduate and undergraduate students within the research groups and other duties required by the research team.

June, 2016- November, 2017: *Research Associate,* Sphaera Pharma Pvt. Ltd., Haryana, India

Highlights:

- Multi-step organic synthesis of medicinal compounds, identification, optimization and development of lead molecules and new targets for drug discovery.
- Designing, Synthesis and Process Development of new selective small molecule inhibitors like Ketohexokinase (KHK), Allosteric inhibitors (collaborated project with *Allosteros Therapeutics Inc*. USA) *etc*. and a structure based medicinal chemistry strategy of lead optimization to increase inhibitor potency and limit any CNS penetration while retaining their high kinase selectivity.

- Handled "*The Wellcome Trust*" funded project for the development of new drug **SPR113** (EC50 of < 50nM) to treat multiple drug resistant (MDR) and extensively drug resistant (XDR) tuberculosis (TB).
- Optimization and scale up from milligram to multi-gram level for industrial set-up using environmental friendly and economical synthesis.
- Developing a chemical transformation based drug modification technologies, which aids drug development of lead molecules or approved APIs.
- Heterocyclic ring systems such as Imidazo-pyrazines, Imidazo-triazines, Aza-indoles, Pyrazoles, Pyrrolo-pyridines, Pyrimidines, Purines, Indoles, Pyridines, benzimizazoles, benzothiazoles, *etc*.
- Cross coupling reactions using transition metal catalysts such as Suzuki, Suzuki-Miyaura, Stille, Sonogashira, Buckwald- Hartwing, Heck reactions etc.
- Purification and characterization of organic compounds using various analytical techniques *viz*. NMR (^{1}H, ^{13}C), 2D NMR (COSY, NOESY, HMBC & HMQC etc.), HPLC, prep-HPLC & Mass spectroscopy (LCMS/MALDI).
- Draft, review and analyze scientific reports and other regulatory documents.

September, 2010- May, 2011: ***Assistant Professor-Chemistry,*** DAV Institute of Engineering and Technology, Jalandhar, Punjab (India).

- Taught *Organic Chemistry* to Engineering graduate students.

EDUCATIONAL PROFILE

Doctor of Philosophy-PhD (2017)

Title of Thesis**: *"Synthesis, Biological Evaluation and Synthetic Transformations of Lactams"***

- Organic/Synthetic Chemistry, Department of Applied Sciences (Chemistry), I. K. Gujral Punjab Technical University, Kapurthala (Punjab), India
  Advisor: Dr. Gaurav Bhargava

Objectives during Ph.D:

- Diastereoselective synthesis of novel diaza-bicyclo[3.2.0]heptan-7-one by intramolecular *endo-trig* haloamination of 3-amino-2-azetidinone.
- Synthesis of proline esters and diaza-bicyclo[3.1.0]hexane by β-lactam synthon methodology
- Imino Diels Alder cycloaddition of 2-azeditinones tethered 1-azadiene for the formation of pyridine and pyrrolo[3,4-b]pyridine lactam hybrids.
- [2+2] Cycloaddition reaction of butadienyl ketene for the synthesis of 3-but-2-enylidene-azetidin-2-ones and spirocyclic-2-azetidinones.
- Cu(I) mediated Kinugasa Reactions of α,β-unsaturated Nitrones and featured its application as a stereo-selective manifold for constructing 3-substituted-styrenyl lactams.
- [2+2] cycloaddition reaction of the butadienyl ketene at high temperature for the synthesis of functionally decorated α-alkylidene-β-lactams.
- Aza-Michael addition reactions of 3-amino-2-azetidinones with variety α,β-unsaturated compounds.

Master of Science (2010)

A formal project entitled**: *"Synthesis and transformations of 3-functionalized 2-azetidinone derivatives"***

- Applied Chemistry(Pharmaceuticals), Department of Chemistry, Guru Nanak Dev University, Amritsar, India
  Advisor: Dr. Vipan Kumar

Bachelor of Science (2008)
Guru Nanak Dev University, Amritsar, India
- Chemistry, Physics, Mathematics

SKILLS

- **Instrumental Knowledge:** Handled Instruments such as Bruker NMR spectrometer, Waters HPLC, Agilent LC-MS and TOF HRMS, Biotage Initiator+ Microwave, UV-Visible and IR spectroscopy, Fluorescence spectroscopy, DLS (dynamic light scattering) and ZP (zeta potential), Scanning electron microscope (SEM), Brunauer, Emmett and Teller (BET), lyophilizer etc.
- **Computer:** Scientific computer software such as Chemdraw, Chem-3D, Mnova, SciFinder Scholar, Microsoft Excel, PowerPoint, and Word.
- **Linguistic:** Fluent in English, Hindi and Punjabi

TEACHING EXPERIENCE

- Taught *Organic Chemistry, Organic Spectroscopy* and *Electrochemical Techniques* to Post-Graduate classes in the Department of Applied Sciences, I. K. Gujral Punjab Technical University, Kapurthala (Punjab), India, **2015-2016**.
- **Assistant Professor-Chemistry**, DAV Institute of Engineering and Technology, Jalandhar, Punjab (India), **2010-2011**

AWARDS AND HONORS

- **2011,** Awarded **Junior Research Fellowship** by University Grant Commission, New Delhi
- **2013**, Awarded **Senior Research Fellowship** by University Grant Commission, New Delhi
- **2018,** Awarded **Postdoctoral Fellowship** by TUBITAK, Turkey-BRITISH COUNCIL, UK.

PUBLICATIONS

1. **Yogesh Kumar**, Bilash Kuila, Dinesh Mahajan, Prabhpreet Singh, Balaram Mohapatra, and Gaurav Bhargava.
"Metal-free diastereoselective synthesis of diaza-bicyclo[3.2.0]heptan-7-one and its transformation to functionalized proline esters"
Tetrahedron Lett. **2014**, *55*, 2793–2795.

2. **Yogesh Kumar**, Prabhpreet Singh and Gaurav Bhargava.
"Diastereo and Facially Selective Imino Diels Alder Cycloaddition of 2-Azeditinones tethered 1-Azadiene: Synthesis of functionalized 1,3,4-trisubstituted-2-azeditinones"
Synlett **2015***, 26*, 363-366.

3. **Yogesh Kumar**, Prabhpreet Singh and Gaurav Bhargava.
"Cu(I) mediated Kinugasa Reactions of α,β-unsaturated Nitrones: A Facile, Diastereoselective Route to 3-(hydroxy/bromo)methyl-1-aryl-4-(-styryl)azetidin-2-ones"
New Journal of Chemistry, **2016** *40,* 8216-8219.

4. **Yogesh Kumar**, Prabhpreet Singh and Gaurav Bhargava.
"Recent developments in the synthesis of condensed β-lactams"
RSC Advances, **2016***, 6, 99220-99250*.

5. Deepak Bains, **Yogesh Kumar**, Prabhpreet Singh and Gaurav Bhargava.
"[2+2] Cycloaddition Reactions of Butadienyl Ketene with 1,4-Diazabuta-1,3-dienes: Synthesis of Functionalized Butadienyl-4-iminomethyl-azetidin-2-ones and Butenylidene-butadienyl-[2,2′-biazetidine]-4,4′-diones"
Journal of Heterocyclic Chemistry **2016**, *53,* 1665-1669

6. Bilash Kuila, **Yogesh Kumar**, Dinesh Mahajan, Kapil Kumar, Prabhpreet Singh, Gaurav Bhargava
"A Facile and Chemoselective Synthesis of 1,4-Benzodiazepin-2-ones and Dienyl Thiazolidin-4-ones"
RSC Advances, **2016**, *6*, 57485

7. **Yogesh Kumar**, Bilash Kuila, Prabhpreet Singh and Gaurav Bhargava.
"Highly Chemo and Diastereoselective Synthesis of Diaza-bicyclo[3.2.0]heptan-7-ones, Pyrrolidines and perhydroazirino[2,3-c]pyrroles"
ARKIVOC **2016***, 6,* 23-44.

8. Nisha, Gaurav Bhargava, **Yogesh Kumar***
"Copper(I)-Catalyzed Regioselective C-H Amination of *N*-Pyridyl Imines using Azidotrimethylsilane and TBHP: A One-Pot, Domino Approach to Substituted Imidazo[4,5-b]pyridines"
ChemistrySelect **2017**, *2*, 7827-7830
(Corresponding Author)*

9. Nisha, Chetan Sharma, Rupesh Kumar and **Yogesh Kumar***
"Regioselective Copper(I)-Catalyzed Ullmann Amination of Halopyridyl Carboxylates using Sodium Azide: A Route for Aminopyridyl Carboxylates and their transformation to Pyrido[2,3-d]pyrimidin-4(1H)-ones"
ChemistrySelect **2018**, *3*, 4822-4826
(Corresponding Author)*

10. **Yogesh Kumar**, Prabhpreet Singh and Gaurav Bhargava.
"[2+2] Cycloaddition of Sorbic Tosylate with Imines/1-Azadienes: A One Pot, Domino Approach for α-Alkylidene-β-lactams and their computational studies and Antimicrobial evaluation"
ChemistrySelect **2018** (Accepted)

Paper Presented at National/International Conferences/Workshops

1. Imino Diels Alder Cycloaddition of 2-Azeditinones tethered 1-Azadiene: Synthesis of functionalized 2-oxo-4-(-styryl)azetidin-3-yl)pyridine hybrids; **Yogesh Kumar**, Gaurav Bhargava; "**3rd DAV national Congress on Science, Technology, Engineering, Humanities and Management (STEHM-2016)"** on 20-21 May, 2016 at DAV Institute of Engineering & Technology, Jalandhar(India).(Poster)
2. An Investigation on Cycloaddition of Butadienylketene with Imines/1-Azadienes: Synthesis of α-Alkylidene-β-lactams; **Yogesh Kumar**, Gaurav Bhargava; "**18th CRSI National Symposium in Chemistry (NSC-18)"** on 5th -7th February, 2016 at Panjab University, Chandigarh.
3. One Day Workshop on **"Workshop on challenges in Analytical Chemistry: Raising the profile of Analytical Science (Symposia on Analytical and Supramolecular Chemistry)**" organized by the *Royal Society of Chemistry* on 4th November 2014 at Indian Institute of Technology (IIT), Delhi.
4. Synthesis and Amidiolytic Ring Opening of Diaza-bicyclo[3.2.0]- heptan-7-one: Entry to Functionalized 4-halo-3-aryl amino-pyrrolidine-2-carboxylic acid methyl esters; **Yogesh Kumar**, Gaurav Bhargava; **"International Multi-Track Conference on Sciences, Engineering and Technical Innovations"** on June 3 & 4, 2014 at CT Institute of Engineering, Management and Technology, Jalandhar, Punjab(India)

5. Metal Free Diastereoselective Synthesis of Diaza-bicyclo[3.2.0]- heptan-7-one; **Yogesh Kumar**, Gaurav Bhargava; **"National Symposium on Advances in Chemical Sciences**" on 27^{th}-28^{th} Feb 2014 at Department of Chemistry, Guru Nanak Dev University, Amritsar(India). (Poster)
6. Lewis acid catalyzed diastereoselective DA cycloaddition reactions of 5-dienyl pyrimidinones: Entry to novel 1,2,4,5 tetrasubstituted Pyrimidinone derivatives; **Yogesh Kumar**, Gaurav Bhargava; **"Physical Sciences : Advances, Challenges And Sustainable Futuristic Trends"** on May 30-31, 2013 at DAV Institute of Engineering & Technology, Jalandhar(India).(Poster)
7. Three Days Workshop on **"Latest Development on the Emerging Green Technologies based on the Applications of Microwave Energy to Material Processing**" sponsored by DRDO and INSA New Delhi on August 20-22, 2012 at Punjab Technical University, Kapurthala.

Personal Information

Date of Birth	:	August 05, 1987
Father's Name	:	Shri Gurdass Ram
Mother's Name	:	Smt. Manjeet Kaur
Nationality	:	Indian

References

1. Dr. Gaurav Bhargava
Associate Professor & Chairman
Department of Chemical Sciences
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2. Dr. Vipan Kumar
Assistant Professor
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3. Dr. Rupesh Kumar
Assistant Professor
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