

Curriculum Vitae

Part A. PERSONAL INFORMATION

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| Name | Shahbaz Ahmad Lone |
| Date of Birth | 13-11-1988 |
| Open Researcher and Contributor ID (ORCID**) | 0000-0001-7288-5934 |
| Gender | Male |
| Nationality | Indian |
| Email | shahbazlone30@gmail.com |
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A.1. Current position

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|---------------------|---|
| Name of University | Central university of Kashmir |
| Department | Department of Chemistry |
| Address and Country | Tulmulla Ganderbal, Srinagar |
| Position | Assistant Professor (Contractual) |
| Key words | Nanobiotechnology, Chemical biology, Drug delivery, Catalysis |

A.2. Education

| Ph.D, Graduate | University | Year | Percentage |
|----------------------|--|------|------------|
| Masters in Chemistry | University of Kashmir | 2012 | 67 |
| B.Ed | University of Kashmir | 2014 | 75 |
| Bachelors in Science | University of Kashmir | 2010 | 60 |
| Ph.D in Chemistry | Indian Institute of Technology (IIT) Roorkee | 2019 | - |

A.3. Awards

| | Subject | Year |
|--|------------------|------|
| CSIR-NET (https://csirhrdg.res.in/) | Chemical Science | 2013 |
| JK-SET (http://set.uok.edu.in/Main/Default.aspx) | Chemical Science | 2013 |
| GATE (Graduate Aptitude Test in Engineering) | Chemistry | 2014 |

A.4. Research and Teaching Experience (Total 3.5 Years)

Postdoctoral Fellow: Institute of biomedical Engineering, NTHU Taiwan since Oct. 2020 to Dec. 2021

Assistant professor: DIT University (Feb. 2020 to May 2020)

Teaching assistant: Undergraduate and post graduate IIT Roorkee- 2015-2018

A.5. General Indicators of quality of scientific production

Total research publications: 7 articles Published, 1 patent (licensed), 2 under Revision, 2 Submitted, Citations: 15

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Part B. CV SUMMARY

I, Shahbaz Ahmad lone received Master's degree in 2012 from University of Kashmir India. After completing my master's degree, I also completed the B.Ed from University of Kashmir in 2014. Meanwhile I qualified the national exams like CSIR-NET, JK-SET, and GATE (Graduate Aptitude Test in Engineering) to avail fellowships for the doctoral Programme. I completed Ph. D in chemistry from the Indian Institute of technology Roorkee (IIT Roorkee) in 2019 under the supervision of Dr. Kalyan K. Sadhu. After Ph. D I worked as an assistant professor for few months at Dehradun Institute

of Technology (DIT University). In October 2020 I joined as Postdoctoral researcher at Laboratory of Nanosensors and Self-powered Nanosystems in the Institute of Biomedical Engineering, National Tsing Hua University from 22th, October 2020 to 31st December 2021.

I have expertise myself in plasmonic nanoparticle synthesis, nano-biotechnology, synthesis of bimetallic nanocomposites, and learned different physicochemical techniques which are used in nanomaterial characterization and analysis. I also have the experience of working with biomolecule functionalized plasmonic nanoparticles, nucleic acid chemistry, organic synthesis, and their characterization. I would further like to extrapolate my substantial experience and research more in this field by incorporating the biotemplate-based approach for designing of bio-based nanomaterials for biological applications.

My postdoctoral research project includes biomolecule based triboelectric nanosensors and photo-thermal catalysts for reactive oxygen species (ROS) generation. In this project thermo catalysts were used for the controlled in situ generation of the ROS. ROS were for disinfection purposes and micro pollutant degradations. Apart from his own work Shahbaz was actively involved in the mentoring of undergraduate and graduate students and was also involved in paper and project report writing. Shahbaz has also implemented his research skills acquired from previous research experience in enriching the overall scientific content of the ongoing research projects. During his stay in the laboratory his research performance was excellent and has published one paper in high reputed journals and others are under preparation or submitted.

My Ph. D thesis entitled as “**Gold-based nanomaterials: biomolecule detection, drug release, and catalytic applications**”. During my Ph. D biomolecules (DNA, Peptides and amino acids) were used for encoded synthesis of gold nanomaterials in a growth-controlled manner as well as the application of these for biomolecule detection and study of DNA-amino acid interactions. Also, the facile route for synthesis of bimetallic gold nanocomposites were used for drug delivery and catalytic applications.

DNA and amino acid encoded synthesis of gold nano-architectures were developed from the single strand amine modified DNAs and L- natural amino acids. Single strand amine modified DNAs encoded the formation of nanoflowers and nanospheres. Mechanistic investigation for the formation of nanoflowers and nanospheres were elucidated. The nanoflowers obtained from were used for the detection of DNA sequence of miR-21. Methionine selectively encoded the formation of coral shaped nano-architectures. Methionine controlled impediment of secondary nucleation leading to nonclassical growth within self-assembled de novo gold nanoparticles.

Encoded synthesis of nanomaterials was also performed with DNA and amino acids. This was used for the detection of arginine and the methodology was further applied for detection of single arginine over lysine in a peptide sequence. Also, the time dependent growth reactions of AuNPs with amine modified DNA in presence of amino acids containing polar side chains was investigated. The sensitivity of these amino acids was rationalized as a combined effect of specific van der Waals interaction, hydrogen bonding and water-mediated bonds between DNA and these amino acids.

A facile route for synthesis of bimetallic Au-Fe_xO_y nanocomposites synthesis was developed. The nanocomposites were used for catalytic applications of organic nitroarene reduction process, host-guest chemistry with doxorubicin drug, and as electro catalysts for oxygen evolution reaction (OER).

Apart from this I have also worked on nucleic acid templated chemistry project where organic fluorophores are attached to the DNA for metal ion based templated chemistry.

Part C. RELEVANT MERITS

C.1. Selected Publications

- [1] Lone, S. A. Lim, K. C.; Kaswan, K.; Fan, K-P.; Zhang, H.; Cheng, J.; Lin Z-H. Recent advancements for improving the performance of triboelectric nanogenerator devices: *Nanoenergy* Just Accepted.
- [2] Sahu, J. K.; Lone, S. A.; Sadhu, K. K. Methionine controlled impediment of secondary nucleation leading to nonclassical growth within self-assembled de novo gold nanoparticles. *Langmuir* **2022**, *doi.org/10.1021/acs.langmuir.2c00489*.
- [3] Bharti, K., Lone, S. A.; Singh, A.; Nathani S.; Roy, P.; Sadhu, K. K. Green synthesis of luminescent gold-zinc oxide nanocomposites: cell imaging and visible light induced dye-degradation. *Front. Chem.* **2021**, *9*, 639090.

- [4] **Lone, S. A;** Sadhu, K. K. Time dependent growth of nanoparticles: Experimental correlation of van der Waals Contact between DNA and Amino Acids with Polar uncharged Side chains. *J. Phys. Chem. C* **2019**, *123*, 20319–20324.
- [5] **Lone, S. A.;** Sadhu, K. K. Gold nanoflower for selective detection of single arginine effect in α -helix conformational change over lysine in 310-helix peptide. *Bioconjugate Chem.* **2019**, *30*, 1781–1787.
- [6] **Lone, S. A.;** Sadhu, K. K. Formation of Growth-Mediated Gold Nanoflowers: Roles of the Reducing Agent and Amine-Modified, Single-Strand DNA Sequences. *ChemPlusChem* **2019**, *84*, 112–118.
- [7] **Lone, S. A.;** Ghosh, S.; Sadhu, K. K. Tryptophan stabilized Au-Fe_xO_y nanocomposites as electrocatalysts for oxygen evolution reaction. *ACS Omega* **2019**, *4*, 3385–3391.
- [8] **Lone, S. A.,** Sanyal, P.; Das, P.; Sadhu, K. K. Citrate Stabilized Au-Fe_xO_y Nanocomposites: Variable Exchange Bias, Catalytic Properties and Host-guest Chemistry with Doxorubicin. *ChemistrySelect* **2019**, *4*, 8237–8245.
- [9] Singh, S. U; **Lone, S. A.;** Ho, H-H; P. Kiran; K. Arshad; L. Sangmin; Lin, Z-H. Advanced Wearable Biosensors for the Detection of Body Fluids by Graphene Materials. *Manuscript under revision*.
- [10] **Lone, S. A.** and Lin, Z-H. A synergistic system for controlled generation of reactive oxygen species for micropollutant degradation. *Manuscript under preparation*.

C.2. Congresses

- [1] **Delivered talk** on “DNA encoded gold nanomaterials for biomolecule detection” ChemDay, 2019, Department of chemistry IIT Roorkee. National level workshop.
- [2] **Poster Presentation** Lone, S. A. and Sadhu, K. K. “Citrate Stabilized Au-Fe_xO_y nanocomposites with variable exchange bias and catalytic properties”. ACS on Campus Symposium’ held at IIT Roorkee 2018. National Level symposium.
- [3] **Workshop** on Thin Film Solar Cells and Emerging Trends in Bioinorganic Chemistry, 2018, Department of chemistry IIT Roorkee. National Level workshop.
- [4] **Poster Presentation** Lone, S. A. and Sadhu, K. K. “Synthesis of Au-Fe_xO_y with variable iron content”. Modern Trends in Inorganic Chemistry (MTIC-XVII) held at CSIR-NCL, Pune and IISER, Pune December, 2017. International Conference.
- [5] Part of Ishan Vikas Programme 2016, Department of chemistry IIT Roorkee.

C.3. Research projects

- [1] **Title of the project:** DNA Chemistry
Reference: Faculty Initiation Grant (FIG 100684) of IIT Roorkee
Financing institution: Indian Institute of Technology (IIT) Roorkee
Participating institutions: IITR
Duration: 2014-2017
Principal investigator: Kalyan K. Sadhu
Type of Participation: Researcher.
- [2] **Title of the project:** Bimetallic nanocomposites
Reference: SERB Grant (EMR/2014/000714)
Financing institution: Science and Engineering Research Board (SERB)
Participating institutions: IITR
Duration: 2014-2017
Principal investigator: Kalyan K. Sadhu
Type of Participation: Researcher
- [3] **Title of the project:** Biomolecule detections
Reference: DST Nanomission (DST/NM/NB/ 2018/237)
Financing institution: Department of Science and Technology.
Participating institutions: IITR
Duration: 2018-2021
Principal investigator: Kalyan K. Sadhu
Type of Participation: Researcher

C.4. Patent

Title: A system method of synthesis of gold-iron oxide and gold-zinc oxide nanocomposites in aqueous medium at room temperature.

Patent: 383507(Application No. 201711024170)

Inventors: Kalyan K. Sadhu and Shahbaz Ahmad Lone

Institution: Indian Institute of Technology Roorkee

C.5. Instrumentation Handling/Data Analysis

UV-Vis Spectrophotometer, FTIR, LCMS, HPLC, CD, Spectrofluorometer and DLS

TEM, FE-SEM, XPS, AFM, SQUID, MALDI and NMR.

C.6. References

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