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Field(s) of Specialization

Nano-Biotechnology, Molecular Biology & Metabolic Engineering

Key Words

Molecular Biology, Nanobiotechnology, FRET, Fluorescent Proteins, Exosomes

Research Interest

My research interest focuses on trying to understand and unraveling the molecular events in the cells and developing Genetically Encoded Fluorescence Resonance Energy Transfer (FRET)-based nanosensors. We are trying to use one of the FRET technique to resolve the various biological process and studying the flux of biomolecules. FRET-based nanosensors are now on the horizon that will allow us to quantify local changes of ions, signaling intermediates, and metabolites in real time.

We have developed protein-based, fluorescent sensors that allow us to track amino acids, heavy metals in live cells non-invasively. We are discovering the molecular nature of FRET nanosensors in yeast, animals and plants, and their mode of action. We are also interested in methods for detection and Isolation of extracellular nanovesicles (Exosomes) and their quantification.

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Employment Profile

Job Title	Employer	From	To
Guest Faculty (F/o Medicine)	Hamdard University	2013-	2014
Assistant Professor	JMI	July, 2014	To date

Academic Qualifications

Examination	Board /University	Year	Division/Grade	Subjects
AISCE (10 th)	CBSE	2000	1 ST with Distinction	õ õ õ õ
AISSE (12 th)	CBSE	2002	1 ST
B.Sc.	JMI	2006	1 ST	BIOTECHNOLOGY
M.Sc.	JMI	2008	1 ST	BIOSCIENCES
Ph.D.	HAMDARD UNIVERSITY	2014	AWARDED	õ õ õ õ ..
DS Kothari Postdoctoral Fellowship	JMI	2014	---	---

Academic/Administrative Responsibilities within the University (JMI)

Asstt. Dean, Students Welfare, JMI (2019-till date)
 Asstt. Director IQAC, JMI (2019-till date)
 Member (Elected), Academic Council of JMI (2018--- till date)
 Member, Board of Studies, Department of Biosciences, JMI (2014--- till date)
 NAAC-Academic Auditor of University, JMI (2019-2020)
 Advisor (CBCS), Department of Biosciences, JMI (2015-2019)
 IQAC-Nodal Officer, Department of Biosciences, JMI (2016-2019)
 Member, Purchase Committee, Department of Biosciences, JMI (2016-2019)
 Warden, School hostels, JMI (2015-2019)
 Team Manager of Badminton, Faculty of Natural Sciences in 2017, 2018, 2019.
 Tabulator of UG, PG, PhD examination of 2014, Department of Biosciences, JMI.
 Member, Standing Committee for Syllabus revision and restructuring, Department of Biosciences, JMI

Academic/Administrative Responsibilities outside the University

Member, Students Research Advisory Committee (SRAC) of Hamdard University, New Delhi.

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Member, Institutional Ethical Committee for Human Research, Satyawati College, Delhi University, New Delhi.

Awards, Associateships

- **JNV Scholarship** from MHRD, Govt. of India in 1995.
- **Qualified joint UGC-CSIR-NET (NATIONAL ELIGIBILITY TEST)** exam under life Sciences scheme in 2008.
- **ICMR-Junior Research fellowship** award in 2009.
- **DST-Travel grant** award to attend the conference in Singapore, in 2012.
- **High Impact Factor** publication award from Hamdard University in 2013.
- **Dr. DS Kothari Post-Doctoral Award** from UGC in 2014.
- **Innovative Research award 2017.**

Fellowships

- **JNV Scholarship from MHRD, Govt. of India** in 1995-2002.
- **ICMR-Junior/Senior Research fellowship** from 2009-2014.
- **Dr. DS Kothari Post-Doctoral Fellowship, UGC** from April-June, 2014.

Detail of the Research Projects as PI

1. **Using FRET-based Nanosensor for *In vivo* Monitoring of the Leucine in Animal Cells**+from UGC, Govt. of India. (*Completed*)
2. **Construction of Genetically Encoded FRET- based Nanosensor for Monitoring of the Flux of Vitamin B1 and Vitamin B12 in Living Cell**+from DST-SERB, Govt. of India. (*Completed*)
3. **Designing and construction of genetically encoded FRET-based nanosensors for in vivo monitoring of metal ions in living cells**+of DBT, Govt of India. (*Ongoing*)
4. **Visualization and monitoring Biotin and Folic Acid using Genetically Encoded FRET- based Nanosensor in Living Cells**+of ICMR, Govt of India. (*Ongoing*)

PhD. Supervised

Ovais Manzoor- Non Net Fellowship (Thesis *Submitted*)
Neha Soleja- UGC-CSIR SRF (*Ongoing*)
Neha Agrawal DBT-SRF (*Ongoing*)
Reshma Bano UGC-CSIR JRF (*Ongoing*)
Irfan UGC-CSIR -JRF (*Ongoing*)

PhD. Co-Supervised

Rahila Nazeer (*Ongoing*)

Postdoctoral Fellow

Dr Preeti Nandal National PDF from DST-SERB, Govt of India (*Ongoing*)

M.Sc. Dissertation Supervised (Completed)

Murtaza Ali

Sonam Kumari

Sabeen Ikram

Umar

Umme Habiba

Shive Narayan Rai

Yashfeen Siddique

Zeba Khan

Varsha Verma

Zeba Firdaus Khan

Varsha Gupta

Ysahfeen Siddiqui

Saba Malik

Shameen

Sheetal Verma

Sajid ul Islam

Manvi Singh

Details of Academic Work

Courses taught at Postgraduate and Undergraduate levels

BSM-32 M.Sc.-III Sem

BSM-42 M.Sc.-IV Sem

BSB-32 BSc.-III Sem

BSB-65 BSc.-VI Sem

PhD Biosciences Course Work- Bioscience III

Teaching

What I value the most in my teaching experiences comes from direct interactions with the students. To become independent scientists, rather than answer given questions, one has to learn how to find relevant questions based on the fact sets we have in our hands. One of the most important missions of faculties, I believe, is to provide help for students while they undergo such a transition.

Participation in Workshops/ Symposia/ Conferences/ Colloquia /Seminars

- Poster presentation on *ōin vivo* metabolite flux measurement using FRET based metabolite sensors in Interdisciplinary science conference- International conference on

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Interphase between physics and biology, on Dec 2-5, 2010 organized by Jamia Millia University, New Delhi.

- Attended "Workshop on Manuscript Writing" organized by the faculty of science Hamdard University, New Delhi on October 30, 2010.
- Poster presentation on "In vivo measurement of leucine using genetically encoded FRET-based biosensor" in Focus on Microscopy-2012, conference organized by Focus on Microscopy Society, on April 1-4, 2012 held in Singapore.
- Participated in Workshop on "Biomedical Communication" on 28th April, 2012 organized by ICMR, New Delhi.
- Oral presentation on "FRET-based nanosensor: A new tool to study the processes of life" in International conference on environment and human health organized by National Environmental Science Academy on Nov 28-29, 2012 in New Delhi.
- Poster presentation on "Genetically encoded FRET-based nanosensor for real time monitoring of methionine in living cell" National conference on Recent Trends in Protein Structural Biology from Dec 16-18, 2013 organized by Jamia Millia Islamia, New Delhi.
- Participated and deliver oral talk on "Genetically encoded FRET-based nanosensor for in vivo monitoring of zinc concentration in physiological environment of living cell" National seminar on metal toxicity and oxidative stress from 23rd to 24th Sept, 2014, organized by Department of Biosciences, Jamia Millia Islamia, new Delhi.
- Manzoor O, Bhadauria R, **Mohsin M**, Optimum environmental conditions facilitate the secretion of potent carcinogen-Aflatoxin B₁ by *Aspergillus flavus*, National Seminar on Environmental Toxicology, Department of Biosciences, Jamia Millia Islamia, New Delhi, February 13-14, 2017
- Soleja N, Manzoor O, **Mohsin M**, FRET-based nanosensors for detection of metal ions, National Seminar on Environmental Toxicology, Department of Biosciences, Jamia Millia Islamia, New Delhi, February 13-14, 2017
- Manzoor O, Bhadauria R, **Mohsin M**, *Aspergillus flavus* secretes the most potent carcinogen-aflatoxin B₁ in wheat flours under optimal moisture and temperature conditions, National Seminar on Biophysics (Biophysika), Centre for Interdisciplinary Research in Basic Sciences, New Delhi, March 16, 2017
- Soleja N, Manzoor O, **Mohsin M**, FRET-based nanosensors for detection of Nickel ions, National Seminar on Biophysics (Biophysika), Centre for Interdisciplinary Research in Basic Sciences, New Delhi, March 16, 2017
- Manzoor O, Soleja N, **Mohsin M**, In vivo measurement of vitamin B1 levels through genetically encoded FRET based nanosensor, National Seminar on Biotechnology in Healthcare: Challenges and Opportunities, Department of Biotechnology, Hamdard University, New Delhi, March 18-19, 2017
- Soleja N, Manzoor O, **Mohsin M**, Construction of FRET-based nanosensors for in vivo measurements of metal ions, National Seminar on Biotechnology in Healthcare: Challenges and Opportunities, Department of Biotechnology, Hamdard University, New Delhi, March 18-19, 2017

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- Manzoor O, Soleja N, **Mohsin M**, *In vivo* measurement of vitamin levels through FRET based nanosensor, National Conference on Biotechnology and Environment, Department of Biotechnology, Jamia Millia Islamia, New Delhi, April 10-11, 2017
- Soleja N, Manzoor O, **Mohsin M**, Construction of genetically encoded FRET-based nanosensors for in vivo quantification of cobalt ions, National Conference on Biotechnology and Environment, Department of Biotechnology, Jamia Millia Islamia, New Delhi, April 10-11, 2017.
- Nanobioteck 2017, 2nd Annual conference of Indian Society of Nanomedicine from 6-8th Dec, 2017 at IISER, Trivandrum, Kerala. Participated in poster presentation.
- Workshop NanoMed 2018 organized by IIT Delhi in partner with DBT, Govt of India on 16th April, 2018.
- Oral Talk in Focus on Microcopy 2018 held in Singapore from 25 to 28 March, 2018.
- Nanobioteck 2018, 2nd Annual conference of Indian Society of Nanomedicine from 24-28th Oct, 2018 at AIIMS, New Delhi acted as a panelist in penal discussion with Govt of India representatives.

Invited Talk

- A talk on *Engineered genetically encoded FRET-based nanosensors to monitor metabolites in living cells*, International Conference on Nanobiotechnology organized by CIRBs, Jamia Millia Islamia, New Delhi, February 5-6, 2018.
- A talk on *Genetically encoded FRET-based nanosensors to monitor nutrients*. Presented at Department of Food Science & Technology, Chaudhary Devi Lal University, Sirsa, Haryana, 28th March, 2019.

Workshops/ Symposia/ Conferences/ Colloquia /Seminars Organized

1. Treasurer, National Conference on Protein Structure and Dynamics in Health and Agriculture, December 03-04, 2017 organized by Department of Biosciences and Centre for Interdisciplinary Research in Basic Sciences, Jamia Millia Islamia, New Delhi.

Academic Foreign Visits

1. Singapore to attend the conference *Focus on Microscopy-2012*. It incorporates:
 - 25th International Conference on 3D Image Processing in Microscopy
 - 24th International Conference on Confocal Microscopy
2. Singapore to attend the conference *Focus on Microscopy-2018*. It incorporates:
 - 31st International Conference on 3D Image Processing in Microscopy
 - 30th International Conference on Confocal Microscopy

Training/ Orientation / Refresher Programmes

1. 115th four-week Orientation Programme by UGC-HRD Center, Jamia Millia Islamia, New Delhi from April 27th to 25th May, 2016.

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2. One Week Induction Programme by UGC-HRD Center, AMU, Aligarh at Jamia Millia Islamia, New Delhi from 16th December to 22nd December 2016.
3. Three Week Refresher course in Life Science by UGC-HRD Center at Centre for Professional Development in Higher Education, University of Delhi, New Delhi, from 17th July to 06th August 2018.

Membership of National and International Professional Bodies

Life member, Indian Society of Nanomedicine (ISNM), AIIMS New Delhi.

Reviewer of the Journals

Current Pharmaceutical Biotechnology

Plos One

Editorial Board Member

EC Proteomics and Bioinformatics

Current Biotechnology

Professional Activity

1. Served as external examiner for Under Graduate practical examination at Department of Botany, AMU Aligarh.
2. Served as external examiner for UG & PG practical examination at Department of Biochemistry, MMA Jauhar University, Rampur.
3. Served as subject panel expert (Judge) for the evaluation of posters presented in International Conference on Nanobiotechnology organized by CIRBSc, JMI, New Delhi.

PATENTS (Filed)

1. A genetically encoded FRET based tool for dynamic sensing of Hg²⁺ in living cells. **TEMP/E-1/45344/2018-DEL** filed on 02-11-2018 to Intellectual Property, India.
2. FRET-based Sensor to Monitor the Arsenic (As³⁺) Dynamics in Single Cells. **TEMP/E-1/54296/2018-DEL** filed on 29-12-2018 to Intellectual Property, India.

SELECTED PUBLICATIONS

1. Soleja N, Jairajpuri MA, Queen A, **Mohsin M**. Genetically encoded FRET-based optical sensor for Hg²⁺ detection and intracellular imaging in living cells. *Journal of Industrial Microbiology & Biotechnology*. 2019 (In press) (**Impact Factor: 3.0**)
2. Soleja N; Manzoor O; Khan P and **Mohsin M**. Engineering genetically encoded FRET-based nanosensors for real time display of arsenic (As³⁺) dynamics in living cells. *Scientific Reports*, 2019, 9, 11240. (**Impact Factor: 4.2**)
(*This work was covered by many national media houses like Hindustan, iBN7, NDTV and Business Standard etc*)
3. Soleja N and **Mohsin M**. Real time quantification of intracellular nickel using genetically encoded FRET-based nanosensor. *International Journal of Biological Macromolecules*, 2019, 138, 6486657. (**Impact Factor: 4.8**)

4. Manzoor O, Soleja N, Khan P, Hassan MI and **Mohsin M**. Visualization of thiamine in living cells using genetically encoded fluorescent nanosensor. *Biochemical Engineering Journal*, 2019, 146, 170-178. (*Impact Factor: 3.2*)
5. Soleja N; Manzoor O; Nandal P and **Mohsin M**. FRET-based nanosensors for monitoring and quantification of alcohols in living cells. *Organic & Biomolecular Chemistry*, 2019 17, 2413-2422. (*Impact Factor: 3.5*)
6. Sharf Ilahi Siddiqui, Ovais Manzoor, **Mohd Mohsin**, Saif Ali Chaudhry. Nigella sativa seed based nanocomposite-MnO₂/BC:An antibacterial material for photocatalytic degradation, and adsorptive removal of dye from water. *Environmental Research*, 2018, 171:328-340. (*Impact Factor: 5.0*)
7. Neha Soleja, Ovais Manzoor, Imran Khan, Altaf Ahmad, **Mohd Mohsin**. Role of green fluorescent proteins and their variants in development of FRET-based sensors. *Journal of Biosciences* 2018, 1-22. (*Impact Factor: 1.8*)
8. Manzoor O; Soleja N; **Mohsin M**. Nanoscale gizmos ó the novel fluorescent probes for monitoring protein activity. *Biochemical Engineering Journal* 2018, 133:83695. (*Impact Factor: 3.2*)
9. Ahmad A; **Mohsin M**; Iqar S; Manzoor O; Siddiqi TO; Ahmad A. Live cell imaging of vitamin B12 dynamics by genetically encoded fluorescent nanosensor. *Sensors and Actuators B: Chemical*. 2018, 257:8666874. (*Impact Factor: 6.4*)
10. Rayees A. Bhat, D. Kumar, Manzoor A. Malla, Sami U. Bhat, Md Shahzad Khan, O. Manzoor, A. Srivastava, Rawoof A. Naikoo, **Mohd Mohsin**, Muzzaffar A. Mir Synthesis, characterization, computational studies and biological evaluation of S-benzyl-b-N-[3-(4-hydroxy-3 methoxyphenylallylidene)] dithiocarbazate. *Journal of Molecular Structure*. 2018, 1156: 280e289. (*Impact Factor: 2.1*)
11. Alam MS, Garg A, Pottoo FH, Saifullah MK, Tareq AI, Manzoor O, **Mohsin M**, Javed MN. Gum ghatti mediated, one pot green synthesis of optimized Gold nanoparticles: Investigation of process-variables impact using Box-Behnken based statistical design. *International Journal of Biological Macromolecules*. 2017,104, 7586767. (*Impact Factor = 4.8*)
12. Manzoor O, Bhadauria R, **Mohsin M**. Colossal contagion of wheat flours with aflatoxigenic fungus aspergillus flavus. Feb 2017 National Conference on Clean and Green Energy, NCGE-2017.
13. Ameen, S; Ahmad, M; **Mohsin, M**; Qureshi, M. I.; Ibrahim, M. M; Abdin, M. Z; Ahmad, A. Designing, construction and characterization of genetically encoded

FRET-based nanosensor for real time monitoring of lysine flux in living cells. *BMC Journal of Nanobiotechnology*. 2016, 14, 49. (**Impact Factor = 5.3**)

14. **Mohsin, M.**, Ahmad, A., Iqbal, M. FRET-based genetically-encoded sensors for quantitative monitoring of metabolites. *Biotechnology letters*. 2015. 37, 1919-1928. (**Impact Factor = 2.1**)
15. **Mohsin, M.**, Diwan, H., Khan, I., & Ahmad, A. Genetically encoded FRET-based nanosensor for *in vivo* monitoring of zinc concentration in physiological environment of living cell. *Biochemical Engineering Journal*. 2015. (**Impact Factor = 3.4**)
16. Ahmad, R; **Mohsin, M**; Ahmad, T; Sardar, M. Alpha amylase assisted synthesis of TiO₂ nanoparticles: Structural characterization and application as antibacterial agents. *J. Hazard. Mater.* 2015, 283, 1716177. (**Impact Factor = 6.5**)
17. **Mohsin, M**; Ahmad A. Genetically-encoded nanosensor for quantitative monitoring of methionine in bacterial and yeast Cells. *Biosensors and Bioelectronics*. 2014, 59, 358-364. (**Impact Factor =9.5**)
18. **Mohsin, M**; Abdin, MZ; Nischal, L; Kardam, H; Ahmad, A. Genetically encoded FRET-based nanosensor for *in vivo* measurement of leucine.. *Biosensors and Bioelectronics*. 2013, 50, 72-77. (**Impact Factor =9.5**)
19. Nischal, L; **Mohsin, M**; Khan, I; Kardam, H; Wadhwa, A; Abrol, YP; Iqbal, M; Ahmad, A. Identification and Comparative Analysis of MicroRNAs Associated with Low-N Tolerance in Rice Genotypes. *PLoS ONE*. 2012, 7, e50261. (**Impact Factor = 2.7**)
20. Chaudhary, AA; Hemant, **Mohsin, M**; Ahmad, A. Application of loop mediated isothermal amplification (LAMP)-based technology for authentication of *Catharanthus roseus* (L.) G. Don. *Protoplasma*. 2011, 249:417-22. (**Impact Factor = 2.6**)

Book Chapter

Mohd. Mohsin, Altaf Ahmad, Mohamad Aman Jairajpuri, Razi Ahmad (2015) FRET Based Genetically-Encoded Nanosensor: A Tool for *in vivo* Monitoring of the Amino Acid Dynamics. Bhupendra Singh (ed) *Nanotechnology: Novel Perspectives and Prospects*, pp. 370-377, Tata McGraw Hill

Conflict of interest. I declare no conflict of interest.

Mohd. Mohsin
07/10/2019