

Sonu Gandhi, PhD

Scientist-D

National Institute of Animal Biotechnology (DBT-NIAB)

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Education

- **Ph.D in Biotechnology**
CSIR-Institute of Microbial Technology (IMTECH) in collaboration with Department of Biotechnology, Panjab University, Chandigarh, India
Thesis Title: “Development of antibody based biosensor for the detection of opiate drugs-heroin and morphine”
*Supervisor-*Dr C Raman Suri
- **M. Sc. in Microbiology**
Department of Microbiology, Jiwaji University, Gwalior, India (2002-2004).
- **B. Sc. (H) in Botany**
Department of Botany, Aligarh Muslim University, Aligarh, India (1999-2002).

Research Experience

- **Scientist-D from 13th July 2018- till date, National Institute of Animal Biotechnology (DBT-NIAB), Hyderabad, India.**
- **Assistant Professor from 5th October 2015- 10th July 2018, Institute of Biotechnology, Amity University, Noida, India**
 1. Biosensor/diagnostic kit development for narcotic drugs, pesticides, preeclampsia, cancer, alzheimer, and parkinson’s disease.
 2. Peptide conjugated Nanoparticles for targeting and imaging of cancer cells. (Projects granted from DST-SERB and DBT-Biocare as Principal Investigator- Total cost- 60 lakhs)
- **Visiting Scientist from 2014 to 2015, Department of Material Science and Engineering, University of Washington, Seattle, USA.**
 1. Lactoferrin conjugated iron oxide nanoparticles for targeting brain glioma cells in magnetic particle imaging
 2. Development of magnetic sensors for protease assays

Mentor: Prof.Kannan M. Krishnan
- **Postdoctoral Research Fellow from 2010 to 2014, Campus IFOM-IEO, Milan, Italy.**
 1. Generation of potent uPAR antagonist by forced proximity engineering of the receptor binding domains of urokinase and Vitronectin
 2. Novel antibodies inhibiting the vitronectin activated uPAR non-proteolytic function and method for efficient isolation

*Mentor:*Dr. Nicolai Sidenius

➤ **Exchange Program at Nanyang Technological University (NTU), Singapore in 2008**

1. FET based sensors for detection of biomolecules.

Mentor: Prof. Subodh Mhasalkar

Research Projects Ongoing as Principal Investigator

- **DBT-Biocare 2016** “Iron oxide nanoparticles-peptide complexes for imaging of urokinase plasminogen activator receptor (uPAR) in cancer diagnostics” (Granted, cost- 24+L)
- **DST-SERB 2016** “Development of peptide functionalized gold nanoparticles for efficient targeting and imaging of urokinase plasminogen activator receptor (uPAR) in cancer diagnostics” (Granted-cost 35L+)

Publications (Total Impact Factor- 101.403, Citation-837, h-index-11, i10 index-12)

- 1) **Sonu Gandhi**, Prince Sharma, Neena Capalash, R S Verma and C. Raman Suri, Group-selective antibodies based fluorescence immunoassay for monitoring opiate drugs, *J. of Analytical and Bioanalytical Chemistry*, (2008), 392, 215-222. (*Impact Factor-3.578*)
- 2) C. Raman Suri, Jasdeep Kaur, **Sonu Gandhi**, G. Shekhawat, Label-free ultra-sensitive detection of atrazine based on nanomechanics, *J. of Nanotechnology* (2008), 19, 235502. (*Impact Factor-3.44*)
- 3) C. Raman Suri, Robin Boro, Yogesh Nangia, **Sonu Gandhi**, Nishima Wangoo, Priyanka Sharma, G. S. Shekhawat, Immunoanalytical techniques for the analysis of pesticides in the environment, *Trends in Analytical Chemistry*, (2009), 28, 29-31. (*Impact Factor- 8.442*)
- 4) **Sonu Gandhi**, Neena Capalash, Prince Sharma and C Raman Suri, Strip based immunochromatographic assay using specific egg yolk antibodies for rapid detection of heroin and its metabolites in urine samples, *Biosensors and Bioelectronics* (2009), 25, 502–505. *highlighted in Nature India* (*Impact Factor-7.78*)
- 5) I Putu Mahendra Wijaya*, **Sonu Gandhi***, Tey Ju Nie, Nishima Wangoo, G. Shekhawat, C. Raman Suri, Isabel Rodriguez, and Subodh G. Mhasalkar, Protein/carbon nanotubes interaction: The effect of carboxylic groups on conformational and conductance changes, *Applied Physics Letters* (2009), 95, 073704. (**contributed equally to work*) (*Impact Factor-3.411*)
- 6) I Putu Mahendra Wijaya, Tey Ju Nie, **Sonu Gandhi**, Robin Boro, Isabel Rodriguez, Subodh G. Mhasalkar, C. Raman Suri, Alagappan Palaniappan, Goh Wei Hau, Femto Molar Detection of 2, 4-dichlorophenoxyacetic acid Herbicides via Competitive Immunoassays using Microfluidic Based Carbon Nanotube Liquid Gated Transistor, *Lab on a Chip*, (2010), 10, 634–638. (*Impact Factor- 6.1*)
- 7) J. N. Tey*, **S. Gandhi***, I. P. M. Wijaya, Al. Palaniappan, J. Wei, I. Rodriguez, C. R. Suri and S. G. Mhasalkar, Direct Detection of Heroin Metabolites using a Carbon Nanotubes Liquid Gated Field Effect Transistor based Competitive Immunoassay, *SMALL*, (2010), 6, 993-998. (**contributed equally*) (*highlighted in Nature India*) (*Impact Factor-8.643*)
- 8) Priyanka Sharma, **Sonu Gandhi**, C. Raman Suri, Fluoroimmunoassay based on suppression of fluorescence self-quenching for ultra sensitive detection of herbicide diuron, *Analytica Chimica Acta*, (2010), 676, 87-92. (*Impact Factor-5.0*)
- 9) Shaveena Thakur, **Sonu Gandhi**, A. K. Paul, C. Raman Suri, A Flow Injection Immunosensor for the Detection of Atrazine in Water Samples, *Sensors and Transducers*, (2011), 131, 91-100. (*Impact Factor- 0.987*)
- 10) Baoyu Zhao, **Sonu Gandhi**, Cai Yuan, ZhipuLuo, Rui Li, Henrik Gårdsvoll, Nicolai Sidenius, Mingdong Huang, Michael Ploug. Stabilizing a flexible interdomain hinge region harboring the SMB binding site drives uPAR into its closed conformation. *Journal of Molecular Biology*, (2015), 427, 1389–1403. (*Impact Factor- 4.6*)
- 11) Baoyu Zhao, **Sonu Gandhi**, Cai Yuan, Zhipu Luo, Rui Li, Henrik Gårdsvoll, Nicolai Sidenius, Mingdong Huang, Michael Ploug. Mapping the topographic epitope landscape on the urokinase plasminogen activator receptor (uPAR) by surface plasmon resonance and x-ray crystallography. *Data in Brief*, (2015), 5, 107–113. (*Impact Factor- 0.5*)

- 12) Asahi Tomitaka, Hamed Arami, **Sonu Gandhi**, Kannan M Krishnan. Lactoferrin conjugated iron oxide nanoparticles for targeting brain glioma cells in magnetic particle imaging. *Nanoscale*, (2015), 7, 16890–16898. (*Impact Factor- 7.76*)
- 13) **Sonu Gandhi**^{\$}, Prince Sharma, Neena Capalash and C. R. Suri. Recent advances in opiate immunosensor for narcotic drug detection. *Bioimpacts*, (2015), 5, 207-213. (*Impact Factor- 3.23*)
- 14) **Sonu Gandhi**, Hamed Arami, Kannan M. Krishnan, Detection of cancer-specific proteases using magnetic relaxation of peptide-conjugated nanoparticles in biological environment. *Nanoletters*, 2016, 16 (6), 3668–3674. (*Impact Factor- 13.8*)
- 15) Pankaj Suman, **Sonu Gandhi**^{\$}, Prahanshu Kumar, Kirti Garg. Prospects of electrochemical biosensor for the early diagnosis of preeclampsia. *American Journal of Reproductive Immunology*, 2017, 77 (1), 1-10 (*Impact Factor- 3.0*)
- 16) Smritee Singh, Priya Mishra, Ivneet Banga, Avanish S Parmar, P P Tripathi, **Sonu Gandhi**^{\$}. Chemiluminescence based immunoassay for the detection of heroin and its metabolites. *Bioimpacts*, 2018, 8 (1), 57-62. (*Impact Factor- 3.23*)
- 17) **Sonu Gandhi**^{\$}, Ivneet Banga, Pawan Kumar Maurya, Sergei A. Eremin. Gold nanoparticles-single chain fragment variable antibody as immunoprobe for rapid detection of morphine by dipstick. *RSC Advances*, 2018, 8 (3), 1511-1518. (*Impact Factor- 3.12*)
- 18) Anita Talan, Annu Mishra, Sergei A. Eremin, Jagriti Narang, Ashok Kumar, **Sonu Gandhi**^{\$}. Ultrasensitive electrochemical immunosensing platform based on gold nanoparticles triggering chlorpyrifos detection in fruits and vegetables. *Biosensors and Bioelectronics*, 2018, 105, 14–21. (*Impact Factor- 7.78*)
- 19) Anita Talan, Annu Mishra, Sergei A. Eremin, Jagriti Narang, Ashok Kumar, **Sonu Gandhi**^{\$}. Detecting chlorpyrifos pesticides using ultrasensitive nanoparticles. *Current Science*, 2018, 114, 1-4. (*Impact Factor- 0.843*)
- 20) Priya Mishra, Ivneet Banga, Roshika Tyagi, Tanya Munjal, Aditya Goel, Neena Capalash, Prince Sharma, CR Suri, **Sonu Gandhi**^{\$}, An immunochromatographic dipstick as an alternate for monitoring of heroin metabolites in urine samples, *RSC Advances*, 2018, 8, 23163-23170. (*Impact Factor- 3.12*)

(\$ = as corresponding author)

Patents

- 1) Nicolai Sidenius and **Sonu Gandhi**. “*Constitutively active uPAR variants and their use for the generation and isolation of inhibitory antibodies*”. US Patent application number PCT/EP2012/065198, International filing date 5th August 2011 (Granted).
- 2) Kannan M. Krishnan, **Sonu Gandhi**, Hamed Arami. “*Detection of cancer-specific proteases using magnetic relaxation of peptide-conjugated nanoparticles in biological environment*”. US Patent application number 62/234998, International filing date 30th September 2015.
- 3) **Sonu Gandhi**. “*Rapid detection of morphine by dipstick kit using gold nanoparticles- single chain fragment variable (AuNPs/scFv) antibody as immunoprobe*”. Patent application number 2017/11041780, National filing date 22nd November 2017.
- 4) **Sonu Gandhi**. “*FTO/AuNPs-based nanosensor for Chlorpyrifos detection in fruits and vegetables*”. Patent application number 2017/11044750, National filing date 14 December 2017.

Book and Book chapter

- 1) **Sonu Gandhi** (2013). Antibody based biosensor for the detection of opiate drugs, LAP LAMBERT Academic Publishing group. ISBN-13: 978-3847373872.
- 2) JN Tey, IPM Wijaya, **Sonu Gandhi**, J Wei, I Rodriguez, SG Mhaisalkar (2010), An Amplification Strategy to Label Free Opiate Drug Detection using Liquid-Gated Carbon Nanotubes Transistor, Nanoscience and Technology Institute; ISBN: 978-1-4398-3401-5.

- 3) Priya Mishra, Tanya Munjal, **Sonu Gandhi** (2018). Nanoparticles for detection, imaging and diagnostic applications in animals. (*Submitted in Springer Nature*)
- 4) Roshika Tyagi, Ivneet Banga, **Sonu Gandhi** (2018). Biosensors and their applications in animal biotechnology. (*Under preparation for Elsevier*)
- 5) Priya Mishra, **Sonu Gandhi** (2018). Biosensors and Lab-on-Chip devices. (*Under preparation for Wiley*)

Scholarships and Awards

- 2018: Distinguished speaker award in SELECT-BIO conference, Bangalore
- 2017: Visiting Faculty at Lomonosov Moscow State University, **Russia**
- 2017: Best Young Investigator Award at IIT-BHU, Varanasi
- 2011: Wonprestigious 2 years Scholarship from **Marie Curie** cofund for post doc research
- 2011: Fellowship to participate in conference, **University of Cambridge, UK**
- 2010: Research highlighted in **Nature India**
<https://www.natureasia.com/en/nindia/article/10.1038/nindia.2010.64>
- 2009: Research highlighted in **Nature India**
<http://www.natureasia.com/en/nindia/article/10.1038/nindia.2009.310>
- 2008: Three months fellowship from **NTU, Singapore** for Ph.D work
- 2007: Award of senior research fellowship (**SRF**) from CSIR

Membership of Societies

- Member of American Society of Chemistry, USA (2017)
- Member of Royal Society of Chemistry, Cambridge, United Kingdom (2016)
- Editorial Member of GRD journal of Engineering (2016)
- Member of Indian Association of Nanoscience & Nanotechnology (2016)
- Guest Editor for Journal of Nanomaterials (2015)

Professional and Mentorship Experiences

- Reviewer for Biosensors and Bioelectronics
- Reviewer for RSC Advances
- Reviewer for Frontiers in pharmacology
- Reviewer for Frontiers in toxicology
- Reviewer for Journal of Nanomaterials
- Reviewer for Sensor & Actuators: Physical
- Ph.D. supervisor for three students at Amity University, Noida, India.
- Mentored one post- graduate student for Master's thesis at University of Washington, Seattle, USA
- Mentored one post- graduate student for Master's thesis at Amity University, Noida, India

Invited Lectures

- 1) **Sonu Gandhi**, Dipstick as an Immunoprobe for Rapid Detection of Morphine by Gold Nanoparticles labeled Single-Chain Fragment Variable Antibody (SELET-BIO), May 24-25, 2018 at Indian Institute of Science (IISc), Bangalore, India.

- 2) **Sonu Gandhi**, Peptide based nanosensor for cancer specific proteases. Advances in biological system and materials science in Nanoworld (ABSMSNW), February 19-20, 2017 at Indian Institute of Technology (IIT), Varanasi, India.
- 3) **Sonu Gandhi**, Lactoferrin mediated delivery of iron oxide nanoparticles for glioma cells. Emerging trends in biotechnology & drug discovery (ETBDD), February 10, 2017 at Institute of Genomics & Integrative Biology (IGIB), New Delhi, India.
- 4) **Sonu Gandhi**, Peptide Conjugated Nanoparticles for the Detection of Cancer-Specific Proteases. 2nd International conference on recent advances in nanoscience and nanotechnology (ICRANN), December 19-20, 2016 at Jawaharlal Nehru University (JNU), New Delhi, India.
- 5) **Sonu Gandhi**, Magnetic Relaxation of Peptide-Conjugated Nanoparticles for the Detection of Cancer-Specific Proteases. National conference on Biotechnological Perspectives in Healthcare, 16th July, 2016 at IMS Engineering College, Ghaziabad, India.

Conference Proceedings

- 1) **Sonu Gandhi**, Neena Capalash, Prince Sharma, C. Raman Suri, Detection of Heroin and Its Metabolites in Urine Samples: A Chemiluminescence Approach. ICB 2016: 18th International Conference on Biosensors. June 09-10, 2016, San Francisco, USA.
- 2) **Sonu Gandhi**, Hamed Arami, Kannan M. Krishnan, Oncogenic protease detection using magnetic particle spectrometry IWMPi 2016. Conference Proceeding on Magnetic Particle Imaging in IEEE. (IWMPi 2016)
- 3) Kannan M Krishnan, **Sonu Gandhi**, Hamed Arami, Amit P. Khandhar, Surface Functionalized Magnetite Nanoparticles: Novel Diagnostic Assays and Imaging Using Magnetic Relaxation Dynamics. 40th MRS Fall meeting and Exhibit, 29th November-4th December, 2015, Boston, Massachusetts, USA.
- 4) **Sonu Gandhi**, Asahi Tomitaka, Hamed Arami, Kannan M Krishnan. Magnetic particle spectroscopy of glioma cells targeted with lactoferrin-conjugated iron oxide nanoparticle contrast agents, Conference Proceeding on Magnetic Particle Imaging in IEEE. (IWMPi 2015).
- 5) **Sonu Gandhi**, Sidenius N, Generation of a potent uPAR-antagonist by forced-proximity engineering of the receptor binding domains of urokinase and vitronectin, European Journal of Cancer, 2013, 49, S212-S212.
- 6) JN Tey, **Sonu Gandhi**, IPM Wijaya, J Wei, CR Suri, I Rodriguez, SG Mhaisalkar, Liquid Gated Carbon Nanotubes Field Effect Transistors (LG-CNTFET) Platform for Herbicide Sensing, ASME 2009 International Mechanical Engineering Congress and Exposition, IEEE, 2009, 249-254.

Selected Presentation in International Conferences

- 1) **Sonu Gandhi**, Biomarkers- From Research to Commercialization (SELET-BIO), May 24-25, 2018 at Indian Institute of Science (IISc), Bangalore, India.
- 2) Akansha Srivastava, **Sonu Gandhi**, Alesh Kumar, R. K. Singhal, Manoj Shrivastava, International conference on Innovations and research in agriculture, food science, forestry, horticulture, aquaculture, animal science, biodiversity, ecology and climate change (AFHABEC), May 19, 2018 at Jawaharlal Nehru University (JNU), New Delhi, India.
- 3) **Sonu Gandhi**, C Raman Suri, International Scientific Conference on Engineering and Applied Sciences (ISCEAS 2017), 24-26 May 2017, Bangkok, Thailand.
- 4) **Sonu Gandhi**, 6th International Conference and Exhibition on Biosensors & Bioelectronics, September 22-23, 2016 Phoenix, USA.
- 5) **Sonu Gandhi**, Hamed Arami, Kannan M Krishnan, 6th International Workshop on Magnetic Particle Imaging (IWMPi 2016), 16-18 March 2016, Lubeck, Germany.
- 6) Kannan M Krishnan, **Sonu Gandhi**, Hamed Arami, Amit P. Khandhar, 40th MRS Fall meeting and Exhibit, 29th November- 4th December, 2015, Boston, Massachusetts, USA.
- 7) **Sonu Gandhi**, Asahi Tomitaka, Hamed Arami, Kannan M Krishnan, 5th International Workshop on Magnetic Particle Imaging (IWMPi 2015) held on 26-28 March 2015, Istanbul, Turkey.

- 8) **Sonu Gandhi**, Sidenius N, European Cancer Congress: Reinforcing Multidisciplinarity, Amsterdam, The Netherlands held in 27 September-01 October 2013.
- 9) **Sonu Gandhi**, Sidenius N, Mechanism of cell transformation and metastasis: Symposium IFOM-Kyoto University, Campus IFOM-IEO, held on 25-27 October 2012 in Milan, Italy.
- 10) **Sonu Gandhi**, Sidenius N, XIIIth International Workshop on Molecular & Cellular Biology of Plasminogen Activation held on 9-13 July 2011 in University of Cambridge, United Kingdom.