

r UMBREEN SHAHEEN

CURRICULUM VITAE

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EDUCATION

2008- 2012 PhD (University of Liverpool, England, UK)

Title: “Delivery, interaction and fate of peptide-capped gold nanoparticles in mammalian cells”
(supervisor: Raphaël Lévy)

2007 – 2008 M.Phil. Course work completion in Biotechnology (NIBGE, Faisalabad campus of Quid-i-Azam University, Islamabad, Pakistan)

2000 – 2002 M.Sc. Zoology (University of Baluchistan, Quetta, Pakistan)

RESEARCH EXPERIENCE

May, 2015- to date

Assistant Professor (TTS) at University of Baluchistan, Quetta, Pakistan, supervising MPhil /MS and PhD research scholars, also teaching Bionanotechnology, Bioinformatics, Biostatistics and other Zoology courses to BS/MS/PhD classes.

Feb, 2013- Feb, 2014

Post-doctoral Research fellow, University of Liverpool, UK, funded by Medical Research Council (MRC), also collaborated with an industrial partner, PROMEGA. The main objective of the job is to produce monofunctionalised gold nanoparticles conjugated with protein of interest and track them in extra/intracellular environment.

Oct, 2012- Feb, 2013

Post-doctoral Research Fellow, EPSRC funded project, University of Liverpool, also a collaboration among different departments in University of Liverpool, University of Manchester, Germany and USA. Project titled “developing contrast and tracking agents for stem cells tracking *in vitro/in vivo*”. Prepared and analysed SPIONs and/or gold nanorods incubated stem cells samples for flow cytometry, toxicity assays, MRI (phantoms), photothermal and photoacoustic imaging, contributed data for a grant application in the same field.

April, 2008- September, 2012

PhD in health and life sciences, University of Liverpool, funded by Higher Education Commission of Pakistan, Project focused on probing different strategies for intracellular delivery of biofunctionalised gold nanoparticles. Viral peptides, bacterial toxin and a pH sensitive polymer nanoparticle delivery system (hydrogel) were employed for intracellular delivery of gold nanoparticles. Having intra/inter group collaborations and an international collaboration with Brett A. Helms (Berkeley laboratory, USA) for carrying out joint projects.

EMPLOYMENT

Aug, 2004- to date

Assistant Professor, Department of Zoology, Faculty of Biological, pharmaceutical and Health Sciences, University of Baluchistan, Pakistan

Teaching, supervision, research, project management, departmental duties etc. I have established a central lab and a Bionanotechnology Lab (Lab D) at Zoology department with the help of two grants i.e., UBRF and NRP. U.

2009-2011

Lab Demonstrator and examiner, University of Liverpool, UK

Supervised undergraduate and graduate students, demonstrated “techniques of cellular and molecular biology” to undergrad students. Worked as examiner for paper checking.

Jan, 2003 – Aug, 2004

Subject Specialist/Executive administrator BPS- 17, Education Department of Baluchistan (Pakistan), worked as SST (senior science teacher BPS-16) and SS (subject specialist BPS-17). During SS appointment; worked as a principal of a secondary school along with teaching biology to SSC level students in Quetta.

COMPETITIVE FUNDINGS

1. NRP. U. project 10675, 2019-2024, HEC grant of 3.2 million PAK rupees for three years project titled” intracellular delivery of biofunctionalised nanomaterials”.
2. University of Baluchistan research fund (UBRF 17/031) for one year project of 0.34 million PAK rupees, 2017-2018, Quetta, Pakistan.
3. Fully funded poster presentation nomination for symposium O, funded by E-MRS, 2011, Nice. France.
4. The graduate school financial support (£ 200) for postgraduate research student: 2009/10, University of Liverpool, UK, for attending CTDM conference
5. Financial support (CHF 520) for first author of selected posters, funded by the Scientific and Organization Committee of the Third international NanoBio Conference, 2010, Zurich, Switzerland.
6. Prestigious overseas PhD fellowship, funded by Higher Education Commission of Pakistan under faculty development project, 2008, Pakistan.

PUBLICATIONS

1. See V, Free P, Cesbron Y, Nativio P, **Shaheen U**, Rigden D, Spiller J, Fernig DG, White MR, Prior IA, Brust M, Lounis B, Levy R. (2009) Cathepsin L digestion of nanobioconjugates upon endocytosis. *ACS Nano*. vol 3, DOI: 10.1021/nn9006994 (IF 15.8)
2. Levy R, **Shaheen U**, Cesbron Y, See V, (2010) Gold nanoparticles delivery in mammalian live cells: a critical review. *Nano Reviews*, vol 1, DOI: 10.3402/nano.v1i0.4889 (IF 3.5)
3. U.Shaheen, Y.Cesbron and Raphaël Lévy, (2010) Bacterial Toxin for Cytosolic delivery of gold nanoparticles, *European Cells and Materials* Vol. 20. Suppl. 3, 2010 (page 237), ISSN 1473-2262. (IF 3.2)

4. Cesbron Y, Free P, Nativo P, **Shaheen U**, Rigden DJ, Spiller, Fernig DG, White MR, Prior IA, Brust M, Lounis B, Levy R and See V (2010) Intracellular Delivery and Fate of Peptide-Capped Gold Nanoparticles. *Biophysical journal*, vol 98, issue 3 Supplement 1, p203a, January 2010 DOI: [10.1016/j.bpj.2009.12.1081](https://doi.org/10.1016/j.bpj.2009.12.1081) (IF 3.2)
5. **Shaheen U**, Cesbron Y, Free P, Raphaël Lévy, (2010) Toxin assisted intracellular delivery of gold nanoparticles *Drug Discovery Today* 15(23):1099-1099. DOI: [10.1016/j.drudis.2010.09.401](https://doi.org/10.1016/j.drudis.2010.09.401) (IF 6.5)
6. **Shaheen U**, Cesbron; Y, Free P, Raphaël Lévy, (2015) TAT and HA2 Facilitate Cellular Uptake of Gold Nanoparticles but do not Lead to Cytosolic Localisation: *PLoS One* 2015 Apr 2; 10(4): e0121683. DOI: [10.1371/journal.pone.0121683](https://doi.org/10.1371/journal.pone.0121683). (IF 2.9)
7. Ruqia Alam, Asim Iqbal, Kashif Kamran, Saima Iram, Saeed Ahmed Essote, Sana Arif, Nosheen Rafique, Hameedullah Kakar, **Umbreen Shaheen**, Shabana Wali Muhammad, “Hospital wastes management at different Government and Private hospitals of Quetta city in Balochistan, Pakista”, *Journal of Biodiversity and Environmental Sciences (JBES)* ISSN: 2220-6663 (Print) 2222-3045 (Online) Vol. 10, No. 1, p. 20-25, 2017 <http://www.innspub.net>
8. Hameedullah Kakar, Asim Iqbal, Kashif Kamran, Sana Arif, **Umbreen Shaheen**, Muhammad Kamran Taj, Abdul Samad, Shahabuddin, Saeed Ahmed Essote, Ruqia Alam, Ahmed Ali, “Morphometric study of *Tetranychus urticae* (Acariformes: Tetranychidae) in Ziarat district, Baluchistan, Pakistan”, *International Journal of Biosciences | IJB |* ISSN: 2220-6655 (Print) 2222-5234 (Online) <http://www.innspub.net> Vol. 10, No. 1, p. 401-407, 2017
9. Yousuf F, **Shaheen U**, Iqbal A, Sumbal A, Baloch C M, “Destructive Fishing Practices Being Applied at The Coastal Areas of Lasbela Balochistan, Pakistan” , *Pakistan's Multidisciplinary Journal for Arts & Science: Vol. 1 No. 01* (2020) ISSN 0228-2792
10. Altaf F, Gul S, Chandio TA, Rehman GB, Kakar A-u-R, Ullah S, Khan N, **Shaheen U**, Shahwani MN, Ajmal M and Manzoor M (2021). Influence of biochar based organic fertilizers on growth and concentration of heavy metals in tomato and lettuce in chromite mine tailings contaminated soil. *Sarhad Journal of Agriculture*, 37(1): 315-324. <http://dx.doi.org/10.17582/journal.sja/2021/37.1.315.324>
11. Siddiqui HJ, Gul S, Kakar A-u-R, **Shaheen U**, Rehman GB, Khan N and Samiullah (2021). Poultry manure as an organic fertilizer with or without biochar amendment: influence on growth and heavy metal accumulation in lettuce and spinach and soil nutrients. *Phyton – International Journal of Experimental Botany*, 90: 651-676. <https://doi.org/10.32604/phyton.2021.011413> (IF. 1.3)
12. Farkhanda, **Umbreen shaheen**, Abdul Samad, Farha Manzoor, Sidra Aftab, Sana Saeed Ahmed, Shoaib Ahmad Malik, Antimicrobial Activity of Silver Nanoparticles against *Salmonella enteritidis* *Pak Euro journal of medical and life sciences*, Vol. 4 No. Special Is (2021): Review Articles May, 2021- December, 2023, <https://readersinsight.net/PJMLS/article/view/2173>
13. Farah Manzoor, **Umbreen Shaheen**, Abdul samad, Influence of AgNPs on foodborne bacteria *campylobacter jejuni*, *Pak Euro journal of medical and life sciences*, vol 4 no. special Is (2021), review articles may 2021- December 2023. <https://readersinsight.net/PJMLS/article/view/2126>
14. Sidra Aftab, **Umbreen Shaheen**, Abdul Samad, Asad Shah, Asadullah, Sana Saeed Ahmad, Farha Manzoor Antiseptic Activity of Silver Nanoparticles Against *E.Coli O157:H7*, *Pak Euro journal of medical and life sciences*, vol 4 no. special Is (2021), review articles may 2021- December 2023. <https://readersinsight.net/PJMLS/article/view/2177>
15. Mohammad Nawaz, **Umbreen Shaheen**, A mini review on synthesis of silver nanoparticles through green chemistry methods, *EUROPEAN ACADEMIC RESEARCH*, ISSN 2286-4822, October 2021, www.euacademic.org, <https://euacademic.org/UploadArticle/5172.pdf>
16. Bilqees Fatima, **Umbreen Shaheen**, “A minireview on antifungal activity of silver nanoparticles”, *European academic research*, vol IX, issue 6/September 2021, DRJI value: 5.9, ISSN 2286-4822, www.euacademic.org
17. Kethran M G, Iqbal A, **Shaheen U**, Fatima B, Shah UA, Kakar SM, “Heavy metal detection in drinking water of Barkhann District, Balochistan, Pakistan”, *European academic research*, vol IX, issue 7/October; 2021, DRJI value: 5.9, ISSN 2286-4822, www.euacademic.org

18. Sana Saeed Ahmed, **U Shaheen**, A Samad, Farha Manzoor, Farkhanda, Irfan Shahzad Sheikh “BIOCIDAL ACTIVITY OF SILVER NANOPARTICLES AGAINST ESCHERICHIA COLI”, Pak-Euro Journal of Medical and Life Sciences, Vol. 4 No. Sp.1, 2021: pp. S96-S104, 2022, Online ISSN: 2707-4471. Print ISSN: 2707-448X
19. Khan I, Chandio T, Gul S, **Shaheen U**, Rehman GB and Jan S (2022). Soil quality and growth performance of crops of agroecosystems in the vicinity of fluorite mining. Applied Ecology and Environmental Research, 20: 2365-2379. http://dx.doi.org/10.15666/aeer/2003_23652379 (IF 0.6)
20. Younas M, Gul S, **Shaheen U**, Rehman SU, Nawaz M, Ziad T, Shaheen G, Ismail T (2022). Soil quality of agricultural lands: a study in Loralai district, Balochistan, Pakistan. Plant Cell Biotechnology and Molecular Biology, 23: 42-53. 10.56557/pcbmb/2022/v23i15-167631 (IF 0.2)
21. Malik Z, **Shaheen U**, Larik E, Ahmed S, Department of Zoology, University of Baluchistan, Quetta, Pakistan , Cutaneous Leishmaniasis Epidemiology in Quetta Pakistan Prevalence, Demographics, and Implications for Public, Pakistan’s Multidisciplinary Journal for Arts & Science|, VOL. 4, No, 03, October.2023 (Page. 01–19), <https://pmdjas.com>, DOI: 10.5281/zenodo.8396307
22. Taran, M.T., Gul, S., Panezai, S., Naseem, M., **Shaheen, U.**, Ziad, T., Laghari, SK., Chandio, T.A., Kakar, A., Agha, S., Panezai, A. 2023. Does land use history have an influence on soil quality? A case study with agricultural lands of Rodh Mulazai, Pishin, Balochistan Pakistan. Food Science and Technology, 43. (IF 2.3 approx.)
23. Khan, M., Gul, S., Kakar, H., Panezai, S., Khan, N., Ziad, T., **Shaheen, U.** (2024). Physico-chemical properties and macrofauna of soils under various farming systems of cold arid region in Balochistan, Pakistan. *Journal of Mountain Science*, 21(8), 2618-2630. (IF 2.3)
24. Sumaira Akram, Asad Ullah, **Umbreen Shaheen**, Jaffar Ali, Muhammad Kashif Ali, Muhammad Atif ali, Nimra Naz, Ayesha Masood, Muhammad Zahid Mustafa1, Shagufta Fahmid and Faizan Ali, “Gold nanoparticles and their conjugates with anticancer drugs: modern era of cancer treatment”, (2024), FUUAST J. BIOL., 14(1): 82-89
25. The Applied Zoological Society Pakistan (AZSP) has selected and published abstracts (O-38/ICAZ 18-19th Dec-2023, O-136/ICAZ 24-25th Nov; 2021, O-178/ICAZ 7-8th Dec-2020) in abstract books online <https://www.azsp.org/publications>

NATIONAL/INTERNATIONAL CONFERENCES & WORKSHOPS

Focal person and resource person for the workshop on “Basic techniques of biosafety and CCHF infection/control” dated 9th May 2024. Sponsored by Pakistan Biological safety Association and Department of Zoology, University of Baluchistan, Quetta.

Invited speaker at university art and literature corner club, University law college, UoB, Quetta 7th September 2024.

Participated in two days hands on work shop for “Practical approaches in bioinformatics”, 16th-17th November 2023, sponsored by FTDC and Dept of Zoology, University of Baluchistan, Quetta.

Oral presenter for “O-38/ICAZ, Spatial Modeling of Cutaneous Leishmaniasis in Quetta and Understanding Current Uprising Trend of The Disease” 6th International Conference on Applied Zoology 18-19th Dec-2023, hybrid model, organized by The Applied Zoological Society of Pakistan & Dept of Zoology, Govt College University Faisalabad., <https://www.azsp.org/publications>

Participated as stakeholder consultant in a two days’ workshop on Rangeland Survey and Mapping Techniques Workshop on 13-14th November 2023 (Monday & Tuesday) at Baluchistan Agricultural Research & Development Centre (BARDC), Brewery Road, Quetta. Balochistan Forest and Wildlife

Department in collaboration with the Revival of Balochistan Water Resources Program (RBWRP), FAO has organized it.

Focal person and participant for “Academia and Science of where, A geological information system (GIS) training”, 10-14th October 2023 sponsored by TBTP-wild life component Lab in collaboration with UoB, Quetta, Pakistan.

Co-organised and participated the international conference on “plant science and management of drylands for agriculture and biodiversity”, 1-2 June; 2022, organised by Dept of Botany, University of Baluchistan, Quetta.

Participant and speaker at One-day training program on Food Technology, Safety and quality Assurance for SMEs held on 14th May, 2022, sponsored by National Business development Program SMEDA

Participant for Webinar on “Frontier of advanced nano-pharmaceutical”, held on 30th June, 2022, sponsored by NIBGE, Faisalabad, Pakistan

Two days’ workshop on “Roadmap and implementation of biosafety and infection control practices in Baluchistan”, 17-18th May-2022 organised by Pakistan Biological Safety Association in Collaboration with microbiology Dept, UoB, Quetta, Pakistan

One day orientation seminar on Self-Assessment Report Writing, 17th June 2022, organised by Quality Assurance and Accreditation Directorate (QAAD), UoB, Quetta.

Organised and participated in two days training workshop on End note, 5-6th October 2021, organised and sponsored by PASTIC in collaboration with FTDC and Dept of Zoology, UoB, Quetta.

“O-136/ICAZ-Antibacterial activity of silver nanoparticles against a locally isolated strain of E. coli., a food pathogen” 4th international conference on applied zoology 24-25th Nov; 2021, organised by Applied Zoological Society of Pakistan, <https://www.azsp.org/publications>

Oral presenter for “Systematic analysis of fungicidal activity of silver nanoparticles against Rhizopus species” 3rd international conference on applied zoology, **O-178/ICAZ, 7-8th Dec-2020,** organised by Applied Zoological Society of Pakistan, QoU islamabad and Govt college university faisalabad. <https://www.azsp.org/publications>

Resource person for two days workshop on “Research Methodology” at Institute of Public health Quetta, Health dept. 03-04th May 2019, organised and sponsored by PASTIC in collaboration with Health Dept, Govt of Baluchistan, Quetta.

Participated in “HEC research grant framework revamping and education governance”, 4th invention to innovation summit, University of Baluchistan, Buy and Sell technology, 24-25th Sept 2019.

Poster exhibitor and presenter for 4th invention to innovation summit, University of Baluchistan, Buy and Sell technology, 24-25th Sept 2019.

Participated in two days training workshop for EndNote 9-10th April 2019, organised and sponsored by PASTIC in collaboration with FTDC and Dept of Zoology, UoB, Quetta.

As a resource person, delivered workshop on, “EndNote, as useful software for research scholars” 15th Feb; 2018, at Pakistan Geological Survey Quetta, organised and sponsored by PASTIC and geological Survey of Pakistan, Quetta

Participation with students in 3rd invention to innovation summit Baluchistan, April, 24-25, 2018

Participation in 1st international conference on material science and technology, (ICMSN 2018) September 3-4, 2018, UoB, Quetta

Three weeks extensive hands-on workshop on ticks’ morphology through camera lucida and electron microscopy conducted at dept of Zoology, UoB, Quetta from 18th November, 2018, sponsored by DESTO Karachi and Zoology Dept, UoB, Quetta

Hands on workshop on biosafety held on Saturday 3rd November 2018, at Bolan medical complex hospital (BMCH) Quetta organised by the dept of haematology, BMCH Quetta

Global chemists code of ethics and laboratory safety and security event at CASVAB, on 26th November 2018 sponsored by Musaji Adam & sons Karachi.

A resource person and trainer for workshop on; “SPSS” 15-16th Mar-2018, organised and sponsored by PASTIC, Quetta, Ministry of Science and Technology And CASVAB, UoB, Quetta

Guest speaker at Govt girls’ postgraduate college Quetta on 23rd Nov-2017 for delivering seminar on ““Industrial horizon for applied Bionanotechnology”” sponsored by principal. at Girls College, Quetta Cantt, 2017.

Speaker for “Applications of nanotechnology in biological industry” at “2nd invention to innovation summit”, 24-25th April 2017, University of Baluchistan, Pakistan

Resource person for “Gold nanoparticles as delivery and tracking agents” for international conference on “Nanosciences: Education and its Industrial Applications” 13-15th Dec: 2016, organized by OIC and COMSTECH, Islamabad, Pakistan.

Speaker for “Bionanotechnology as an interdisciplinary subject”, Physics Department, UoB, Quetta, 2016 Completed five days “Bio-risk management” course sponsored by Relief International, 17th-21st October, 2016 at Dept of Zoology, Quetta, Pakistan

Participation in workshop on “techniques in disease diagnosis and vaccine production” at CASVAB, 25-27th October, 2016 sponsored by HEC and CASVAB, Quetta.

Speaker for “Harnessing nanomaterials for biological applications” And also have chaired a session, at Second International Nano-Bio-Med conference, 14-18th Oct; 2013, ICTP, Trieste, Italy

Tracking Halo-tagged proteins using Halo-ligand functionalized gold nanoparticles, International symposium, “Stem Cell Tracking” 1-2nd July, 2013, Liverpool. UK

Gold nanoparticles coated cationic polymeric hydrogel colloids as efficient cellular delivery vehicle, European Materials Research Society (E-MRS) spring conference, Symposium O, France, Nice, April 2011

Toxin-assisted cellular delivery of gold nanoparticles, Third international symposium, “Cellular Delivery of Therapeutic Macromolecules (CDTM) June 2010”

North-West Enterprise School Training workshop, 2010 and participation in Biotech Yes competition, Manchester, 2010, team leader for team 19 for learning project finance and marketing management.

Liverpool Student Associate Scheme certificate of achievement in teaching, 2009-2010, University of Liverpool, UK

International Thematic Workshop on Nanomedicine: “The use of nanoparticles in medical diagnosis”, 13-20th March 2008, sponsored by COMSTECH and HEC, Islamabad, Pakistan.

One month 18th Nov-19th Dec, 2005, “staff development course” by National Academy of Higher Education, Pakistan at UoB, Quetta, Pakistan.

SUPERVISION

Fehmida Yousaf	MPhil Destructive fishing practices being applied in Lasbela, Baluchistan
G. M. Khetran	MPhil Heavy metal and microbial assessment in drinking water of Barkhan
Bilqees Fatima	MPhil Antifungal activity of silver nanoparticles against bread fungus
Mohammad Nawaz	MPhil Evaluation of SNPs synthesized by green synthesis method for mosquito control in Quetta
Farkhunda	MPhil Study of Biocidal effect of SNPs against Salmonella enteritidis
Farah	MPhil Antimicrobial activity of SNPs against Campylobacter jejuni
Sidra Aftab	MPhil Studying antiseptic activity of SNPs against E. Coli (0157-H7)
Sana Saeed	MPhil Study of toxicity of SNPs on E.Coli (ATTCC-25922)
Zahida Malik	MPhil Prevalence of cutaneous leishmaniasis in Quetta city, Baluchistan

Sumaira Akram	MPhil 2022- to date. Anticancer activity of bioconjugated GNPs against SW620 colorectal cancer cell line
Fehmida Yousaf	PhD. 2024 Use of nanomaterials for assessing shelf-life improvement in local Mackerel fish, Working on her synopsis
Sanauallah Co-supervisor	PhD-2024 Screening of wound healing effects of dermal ointment based on ginkgo biloba and panax ginseng extracts in diabetic rats. Synopsis has been approved
M. Adil, Sher Hussan, Behroze Marri	BS-2022 Collection of Local medicinal plants; use by locals of Hanna Urak, Baluchistan
Faizan, Hina and Mohammad Idrees	BS-2023 A systematic study of macro-fauna and flora diversity of Chiltan Mountain, Baluchistan
Mohammad Saqib, Hifza and Roman	BS-2024-todate. Green synthesis and characterization of GNPs using local medicinal herbs of Baluchistan

ACADEMIC COURSES DESIGNED AND IMPLIMENTED

- **Bionanotechnology I; 4(3+1) credit hours, Bionanotechnology II; 4(3+1) credit hours** for MSc (3rd and 4th semesters), MPhil (first and 2nd semesters), BS (7th and 8th semesters) and PhD (2nd semester) have been designed and approved for Dept of Zoology. I have been teaching them as special papers since 2017 to date.
- **Applied Nanotechnology (3(2+1) Credit hours** for BS 7th Semester (as optional course) has been approved recently for all BS running colleges and for UoB Zoology Dept which will replace previous Bionanotechnology special paper.
- **Epidemiology I; 4(3+1) Credit hours and Epidemiology II; 4(3+1) Credit hours** for MPhil first and second semesters; have also been approved as supplementary agenda recently and I am teaching it to MPhil 2024-25 batch.

COLLABORATIONS

CASVAB (Quetta), DESTO (Karachi), NIBGE (Faisalabad), Wild Life (Govt of Baluchistan), Botany Dept (UoB, Quetta), Agriculture Dept (Govt of Baluchistan), vector born disease control center (Govt of Baluchistan)

TECHNIQUES AND SKILLS

1. Cell Biology

- Culturing of Stem cells (human/mouse kidney and mesenchyme stem cells) and mammalian cells (DAOY, HEK 293 and HeLa cells)
- Characterization of cells using bright field microscopy, confocal microscopy, TEM, flow cytometry and quantitative analysis of their growth profiles (especially for stem cells) over successive passage numbers and in different mediums.
- Cytotoxicity assays (e.g., MTT) to assess the impact of nanoparticles (GNPs, and SPIONs) or bacterial toxin on kidney stem cells, HeLa cells and other cancer cell lines.
- Immunostaining of fixed cells and dot blots for protein conjugated GNPs
- Microinjection of biofunctionalised gold nanoparticles inside the HeLa cells.
- Culturing locally isolated bacterial strains/fungus for assessment of antimicrobial activity of silver nanoparticles (SNPs)
- Culturing of mosquito larvae at lab and treating them with silver nanoparticles
- Analysis of soil macrofauna
- Analysis of soil nitrates and phosphate contents
- Certified scientist for Lab biosafety implementations

2. Imaging and analysis

- Transmission electron microscopy of nanoparticles, preparation of cells sections and rips off of plasma membranes samples for viewing under the TEM.
- Quantitative analysis of TEM data using ImageJ and/or stereological grids.
- Confocal fluorescence microscopy of fluorescently labeled mammalian cells/ stem cells and data analysis using Zeiss and LSM soft wares.
- Measuring the fluorescence and granularity of SPIONs fed stem cells quantitatively using flow cytometer (FACS) and data analysis using cyflogic software.
- Photothermal microscopy data analysis using ImageJ

3. Synthesis/functionalization of gold nanoparticles

- Application of different chemical synthesis methods for synthesis of gold and silver nanoparticles of desired size.
- Bioactive compounds extraction from herbal plants for making nanoparticles. This is called green synthesis methods.
- Characterization of drugs, chemicals, gold and silver nanoparticles using UV-vis spectrophotometer and electron microscopy (TEM/STEM) and Dynamic Light Scattering (DLS) techniques.
- Functionalization of gold nanoparticles with peptides, oligonucleotides and PEG
- Usage of CPS, a disc centrifuge nanoparticle analyser to measure the ligands shell thickness around the gold nanoparticle's core.
- Different chromatography techniques *e.g.*, heparin affinity chromatography, size exclusion chromatography, ion exchange chromatography, Nickel-affinity chromatography for purification and isolation of biofunctionalised (protein/PEG/peptides conjugated) gold nanoparticles.

4. Computing/other skills

- Usage of Protein/peptides and DNA/RNA structural and sequential online data banks and software (BLAST, UniProt, CLUSTALOmega) etc.
- Full command on Microsoft office, SPSS, Origin Lab, Coral, ImageJ, Chem Draw, EndNote/refwork *etc.*
- Organized computed and manual storage of office files.
- Using GIS and google earth software for mapping animals' movement and insect vectors hot spot analysis.
- Managing grant account for Lab hard wares and consumables, official travels and account auditing etc.
- Command on Project writing, management, finance and marketing due to multiple entrepreneurial training courses and because of projects management.