

Hossein Khadem

IEOS Institute of Experimental Endocrinology and Oncology "G. Salvatore"-Second Unit
National Research Council (CNR)

EDUCATION

Ph.D., Photonics **2013-2019**

Laser and Plasma Research Institute

Shahid Beheshti University, Tehran, Iran

Supervisor: Seyed Hassan Tavassoli

Dissertation: *Experimental and theoretical study of the effect of size-asymmetry in plasmonic heterodimers for surface-enhanced Raman spectroscopy (SERS)*

M.Sc., Photonics **2011-2013**

Laser and Plasma Research Institute

Shahid Beheshti University, Tehran, Iran

Supervisor: Seyed Hassan Tavassoli

Thesis: *Sensing of refractive index changes of liquids using localized surface plasmon resonances (LSPRs) of gold nanorods: theoretical and experimental study*

B.Sc., Physics **2007-2011**

Ferdowsi University of Mashhad

PROFESSIONAL EXPERIENCE

Post-doctoral Researcher **2023-2024**

IEOS Institute of Experimental Endocrinology and Oncology "G. Salvatore"-Second Unit

National Research Council (CNR), Naples, Italy.

Fields of research:

- Quantitative phase imaging of cancer cells
- Raman spectroscopy of large oncosomes
- Correlative fluorescence and holography microscopy of lipid droplets

Post-doctoral Researcher **2019-2022**

Laser and Plasma Research Institute

Shahid Beheshti University, Tehran, Iran

Fields of research:

- Fabrication of low-cost SERS substrates for detecting arsenic in drinking water
- SERS capillary sensors for fast and sensitive detection
- Evaluation of Iranian honey using Raman spectroscopy
- Theoretical study of optical coupling and SERS-activity of plasmonic dimers

- Nanoparticle-enhanced laser-induced breakdown spectroscopy (NE-LIBS)

Co-founder and Technician

2015-2022

Teksan Company

Beheshti Science and Technology Park, Tehran, Iran

Responsibilities:

- Design and production of Raman microscope
- Design and fabrication of SERS substrates
- Applications of Raman spectroscopy
- Scientific workshops and supports

AWARDS AND HONORS

- First place and LAMP award sponsored by The Optical Society (OSA) Winter college on applications of optics and photonics in food science, The Abdus Salam International Center for Theoretical Physics (ICTP), Trieste, Italy, February 2019.
- Ranked 1st in GPA among PhD candidates, Laser and Plasma Research Institute, Shahid Beheshti University, Tehran, Iran, 2019.
- Ranked 1st in comprehensive examination among PhD candidates, Laser and Plasma Research Institute, Shahid Beheshti University, Tehran, Iran, 2016.
- Ranked 25 among 500 applicants in national PhD exam in Iran, 2014.
- Ranked 49 among 1200 applicants in national Master exam in Iran, 2011.

PUBLICATIONS

Click on the titles to view at publisher's website.

- A.A. Huzortey, A. Arefi, B. Anderson, H. Khadem, S.S. Sackey, E. Mahmoodi-Khaledi, S.H. Tavassoli. "532 nm laser excited Raman spectroscopic evaluation of Iranian honey." *Food Analytical Methods*. 15. 772 (2022).
- P. Noorbakhsh, H. Khadem, S.H. Tavassoli. "Analysis of the level of arsenic in water by surface enhanced Raman spectroscopy (SERS)." *ICOP & ICPET* (2020).
- H. Khadem, S.H. Tavassoli. "The effect of size-asymmetry of plasmonic heterodimers in surface-enhanced Raman scattering (SERS)." *Applied Physics Letters*. 114, 251901 (2019).
- H. Khadem, S.H. Tavassoli. "Well-ordered self-assembled plasmonic dimers for surface-enhanced Raman scattering (SERS)." *Materials Today Communications*. 20, 100593 (2019).
- N. Sadegh, H. Khadem, S.H. Tavassoli. "High Raman-to-fluorescence ratio of Rhodamine 6G excited with 532 nm laser wavelength using a closely packed, self-assembled monolayer of silver nanoparticles." *Applied Optics*. 22, 6125 (2016).
- H. Khoshroo, H. Khadem, M. Bahreini, S.H. Tavassoli, J. Hadian. "Quantitative analysis of essential oils of *Thymus daenensis* using laser-induced fluorescence and Raman spectroscopy." *Applied Optics*. 32, 9533 (2015).
- N. Sadegh, H. Khadem, S.H. Tavassoli, "Fluorescence suppression in Raman spectroscopy using photobleaching method for pharmaceutical samples." *ICOP & ICPET* (2014).
- H. Khoshroo, H. Khadem, S.H. Tavassoli, "Effect of laser polarization orientation relative to spectrometer grating rules on Raman spectroscopy." *ICOP & ICPET* (2014).

INVITED TALKS

- "Experimental Raman spectroscopy for soil analysis", Shahid Chamran university of Ahvaz, Khuzestan, Iran, March 2021.
- "Photonics startups in Iran", National Radio of Iran, January 2021.
- "Experimental Raman spectroscopy for microplastic analysis", Iranian national institute for oceanography and atmospheric science, Tehran, Iran, December 2020.
- "Raman spectroscopy: principles, applications, and modern techniques", Alzahra university, Tehran, Iran, November 2020.
- "Surface-enhanced Raman spectroscopy (SERS): fundamentals and applications", Institute for Advanced Studies in Basic Sciences, Zanzan, Iran, June 2019.

CONFERENCES AND MEETINGS

- "Fabrication of SERS-based sensor for quantitative detection of arsenic in water", Oral presentation, 8th International Conference on Nanostructures (ICNS8), Tehran, Iran, November 2020.
- "Surface-enhanced Raman spectroscopy (SERS) for studying fluorescent samples", Oral presentation, 21st Iranian conference on optics and photonics (ICOP 2015), Tehran, Iran, 2015.
- "Theoretical investigating the optical properties of gold nanorods to design optimal refractive index nanosensors: a DDA-based study", Poster presentation, Ultrafine Grained and Nano-Structured Materials (UFGNSM), Tehran, Iran, 2013.

COLLEGES AND WORKSHOPS

- Hands-on workshop on diffuse optics for health assessment, November 2023, Politecnico di Milano, Milan, Italy.
- Winter college on optics: advanced optical techniques for bio-imaging, February 2017, ICTP, Trieste, Italy.
- Winter college on applications of optics and photonics in food science, February 2019, ICTP, Trieste, Italy.

SKILLS

- Spectroscopy:
 - o Raman spectroscopy and microscopy
 - o Surface-enhanced Raman spectroscopy (SERS)
 - o Time and polarization-resolved spectroscopy
 - o Laser-induced breakdown spectroscopy (LIBS)
 - o Fluorescence spectroscopy
 - o UV-Vis spectroscopy
- Optics:
 - o Design of optical setups
 - o Optical alignment
- Chemistry:
 - o Synthesis of metal nanoparticles
 - o Hierarchical assembling of nanoparticles
 - o Fabrication of SERS substrates

- Software:
 - o Multivariate analysis
 - o Optical simulation of plasmonic structures with COMSOL and DDA
 - o Programming: Python, MATLAB
 - o General: Microsoft Office, OriginLab, Adobe Photoshop, SolidWorks
- Advanced analysis:
 - o Scanning electron microscopy (SEM), Dynamic light scattering (DLS), X-ray diffraction (XRD)

ACHIEVEMENTS

- Participation in the manufacture and production of the first commercial Raman microscope in Iran, Teksan Co., Tehran, Iran.
- Sales and export of more than 20 Raman microscopes, Teksan Co, Tehran, Iran.

SERVICE

- Head of organization committee, International day of light ceremony at Shahid Beheshti University, Tehran, Iran, 2018.
- Member of organization committee, 21st Iranian conference on optics and photonics (ICOP 2015), Tehran, Iran, 2015.

HOBBIES

- Science outreach programs for students, History of science, Science photography, Museum tour, Hiking, Persian calligraphy and architecture

REFERENCES

- **Anna Chiara De Luca**
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- **Seyed Hassan Tavassoli**
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 Laser and Plasma Research Institute (LAPRI)
 Shahid Beheshti University, Tehran, Iran
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