

Leili Hayati

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Professional Summary

Researcher specializing in design and simulation of nano/micro optics and electromagnetics devices; strong theoretical background in quantum nonlinear optics and electromagnetics; experienced user of HFSS to simulate RF/Microwave Magnetic devices. Laboratory experience in the field of ferrite nano-particles and magnetic nano-ferrofluid; familiar with a variety of techniques for fabrication and synthesis of high-purity ferrite nanowires in silicon membrane; measuring and analyzing magnetic materials from bulk to nano-structure using magnetic characterization techniques such as VSM and FMR. Collaborated with other research groups to manage different research projects in nanotechnology.

Education

Northeastern University, Boston, MA | PhD in Electrical Engineering, GPA = 3.77 2020

Tabriz University, Tabriz, Iran | M.Sc. in Nano-electronics 2012

Zanjan University, Zanjan, Iran | B.Sc. in Telecommunication Engineering 2007

Research Experience

Northeastern University, Department of Electrical and Computer Engineering, Boston, MA
Graduate Research Assistant

Microwave Materials Lab 2016 - 2020

- Applied a variety of novel techniques to fabricate ferrite nanowires inside a porous silicon membrane using either ferrite nanoferrofluid, or sol-gel precursor
- Successfully synthesizing YIG material via chemical sol-gel method; improved significantly YIG purity by adjusting experimental conditions, such as oxygen flow and solution concentration; analyzed crystallization of synthesized material using XRD technique
- Designed a custom vacuum chamber to fabricate YIG nanowires
- Analyzed and characterized ferrite YIG nano-particles and YIG nanowires using magnetic characterization techniques such as FMR and VSM; confirmed super-paramagnetic behavior of ferrite YIG nano-particles and shape anisotropy of in-lab synthesized YIG nanowires
- Designed and simulated a self-biased microstrip circulator in high microwave frequency based on meta-magnetic material using HFSS software
- Simulated a CPW phase shifter in ultra-high frequency region based on YIG nanowires magnetic parameters

Computational Electromagnetic and Physics Lab 2014 - 2016

- Collaborated with Physics Department to explore interaction between light and coupled semiconductor quantum dot (SQD)-plasmonic metal nano-particle (MNP)
- Developed self-consistent field method to model optical response of a large hybrid networks consists of SQDs and MNPs

Bose Corporation, Department of Research and Development, Framingham, MA
Research Assistant Intern

Summer & Fall 2019

- Developed measurement techniques to improve the performance of Bose wireless wearables
- Measured, collected and analyzed per machine learning a huge amount of data from Bluetooth wireless headphones to predict fading behavior and classify body movements
- Contributed meaningfully to the NFMI/NFEMI investigation team by statistics data analysis to explore wireless earbuds performance

Tabriz University, Department of Electrical and Computer Engineering, Tabriz, Iran
Graduate Student Researcher

School of Engineering Emerging Technologies 2009 - 2012

- Explored deeply physics behind quantum nonlinear optics phenomena such as Lasing without population Inversion (LWI), Raman scattering amplification and Electromagnetically Induced Transparency (EIT)
- Designed and simulated a THz Nonlinear Quantum Dot Cascade Laser based on LWI for master thesis and defense
- Collaborated with two colleagues on an independent project to design and simulate a high sensitive optical biosensor, which established based on EIT phenomenon using Lambda-type three-level atomic system

Zanjan University, Department of Electrical and Computer Engineering, Zanjan, Iran 2003 - 2007
Undergraduate Student Researcher

- Implemented the idea of swarm robotics using three ATmega16 AVR microcontrollers based on wireless receiver and transmitter modules. Programmed microcontrollers by Code Vision and Max Plus software

Teaching Experience

Northeastern University, Department of Electrical and computer Engineering, Boston, MA 2015 - 2020

Teaching Assistant at laboratory for Electrical Engineering lab, Circuits / signals for Biomedical Applications and Electronics Lab

- Taught all sessions as instructor of record
- Provided written feedback on weekly lab reports for up to 70 students; Evaluated and reported student performance
- Guided students to solve problems in their circuit design

Teaching Assistant for graduate level courses such as Optics for Engineers and Biomedical Optics

- Invited to lecture for two sessions
- Graded and provided feedback on weekly students' homework and project

Coursework

Antenna Theory, Electromagnetic Theory I & II, Electronic Circuits I & II, Micro and Nanofabrication, Microwave Devices, Nano Photonics, Nano Electronics I & II, Physics of Polymer, Quantum Electronics, Quantum Transmission, Telecommunication Circuits, Project Management and Leadership Skills.

Technical Skills

Laboratory Instrumentation:

Ferromagnetic Resonance (FMR) Characterization, Vibrating Sample Magnetometer (VSM), X-Ray Diffraction (XRD), SEM, TEM, EDX, FTIR, Ultrasonic Probe Sonicator

Software Packages:

MATLAB, ANSYS HFSS, CST, NEXTNANO, MS Office

Others:

Grant writing for NSF, Data Analysis, Research and Development

Languages

English (Fluent), Persian (Native)

Selected Peer-Reviewed Publications

L. Hayati, A. Ghanbarzadeh, F. Lombardi, C. Vittoria, "Synthesis and Characterization of High-Purity YIG Nanowires Inside a Porous Silicon Membrane by the Sol-Gel Method" IEEE Magnetics Letters, Volume 11 (2020).

L. Hayati, S. Zare, F. Lombardi, C. Vittoria, "Ferromagnetic resonance of Y₃Fe₅O₁₂ nanowires" IEEE Magnetics Letters, Volume 9 (2018).

L. Hayati, C. Lane, B. Barbiellini, A. Bansil, H. Mosallaei "Self-consistent scheme for optical response of large hybrid networks of semiconductor quantum dots and plasmonic metal nanoparticles" Phys. Rev. B 93, 245411 (2016).