Anwer Hayat

Date of birth: 03/11/1989 | **Nationality:** Pakistani | **Gender** Male | (+86) 15601261007 |

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School of Physics and optoelectronic, Beijing University of Technology, Beijing, China.,
College of Optical Science and Engineering, Zhejiang University, Zijingang Campus,
310058, Hangzhou, China

WORK EXPERIENCE

08/2012 – 02/2014 – Karak, KPK, Pakistan
PHYSICS LECTURER – SHAHEEN CHILDREN ACADEMY AND COLLEGE OF SCIENCES

06/2015 – 09/2016 – Mansehra, KPK, Pakistan
PHYSICS LECTURER – SKY INTERNATIONAL SCHOOL AND COLLEGE

02/2017 – 08/2017 – Murree, Pakistan
PHYSICS LECTURER – IQRA RESIDENTIAL SCHOOL AND COLLEGE

EDUCATION AND TRAINING

04/09/2017 – 09/05/2021 – Beijing, China
PH.D. – Beijing University of Technology

Research Area: Design, Fabrication, and Characterization of the microcavity lasers.

Field(s) of study

- Physics
- Optical Engineering

Thesis: Quantum dot lasing in different distributed feedback cavities

01/03/2014 – 05/01/2017 – Mansehra, KPK, Pakistan
M. PHIL – Hazara University

Research Area: Designing optical amplifiers and fiber lasers, optical system WDM design, and Engineering the fiber nonlinearities and dispersion using Optisytem Simulator.

Field(s) of study

- Physics
- Optical Fiber communication

CGPA: 3.67/4 |

Thesis: Performance Analysis of Transmitting 80 GB/S DWDM system using Erbium Doped fiber Amplifier

09/09/2008 – 28/09/2012 – Peshawar , Pakistan
BACHELOR OF SCIENCE (BS) – Islamia College

Major Subject: Physics, **Minor Subjects:** Mathematics and Statistics.

Field(s) of study

- Physics

CGPA: 3.17/4 | Thesis: Vacuum Technology and its Applications in different fields

LANGUAGE SKILLS

Mother tongue(s): PASHTO AND UDRU

Other language(s):

	UNDERSTANDING		SPEAKING		WRITING
	Listening	Reading	Spoken production	Spoken interaction	
ENGLISH	C2	C2	C2	C2	C2
CHINESE	A1	A1	A1	A1	A1

Levels: A1 and A2: Basic user; B1 and B2: Independent user; C1 and C2: Proficient user

DIGITAL SKILLS

Miscrosoft office | Seminar Presentation | Expert in internet surfing, mailing, and browsing | Office data management | Simulation software used to design and study optical properties of microcavities lasers

RESEARCH EXPERIENCE

Ph.D. Field of Interest

During my Ph.D., I focused on the design, fabrication, and characterization of the microcavities (e.g., whispering gallery modes (WGM), random, and distributed feedback (DFB)). More specifically, I have realized multi-wavelength emissions in distributed feedback microcavity lasers based on colloidal quantum dots. The main innovative work and results achieved during my Ph.D. studies are as follows.

1. **Multiwavelength colloidal quantum dots lasing in 2nd order periodic DFB cavities:** Here, interference lithography and spin-coating technique are combined to generate 1D and 2D (rectangular) DFB lasers on the flexible substrate. The rectangular cavity emits two DFB lasers in a single device while mechanical flexibility of the PET substrate is used to tune the emission wavelength of the 1D DFB lasers.
2. **Multiwavelength colloidal quantum dot lasing in 2nd order 2D quasicrystals:** Here, we used a specially designed pentagonal prism for interference holographic lithography to generate a 2D quasicrystal having a 10-fold rotational symmetry. The 2D quasicrystals covered with a colloidal quantum dot were optically pumped to realized surface multi-wavelength emissions. An analytical model based on the cavity mode coupling effect was developed to explain the underlying mechanism of multi-wavelength emissions in the 2D quasicrystal lasers. Finally, the polarization effects of the multi-wavelength emissions were successfully explained by the symmetrical polarization effect.

M.Phil. Filed of Interest

During my M.Phil, I have chosen optical fiber communication as a research field. Most of my work was carried out in designing and study the optical properties of optoelectronic devices including designing optical amplifiers, fiber lasers, optical WDM system design, optimizing and flattening the EDFA gain for WDM lightwave system. After designing these optoelectronic devices "**Optisystem simulations"** were carried to study the output response and related optical properties. The main innovative work carried during my M.Phil. are as follows:
Here I have demonstrated “the performance of 80 Gbit/sec (20 Gbit/sec each channel) DWDM system using EDFA was simulated by using Optisystem software". The performance of the proposed system has been analyzed in terms of Quality factor, minimum BER, eye height, and threshold.

Bs Field of interest

In Bs, I have studied some basic and advanced courses related to the major subject (Physics) and minor subjects (Mathematics and Statistics). Along with this performed some basic physics experiments.

CONFERENCES AND SEMINARS

05/03/2015 – 06/03/2015 – NILOP, Islamabad, Pakistan.
GaN based Light Emitting Diodes (LEDs) and Laser Diodes

07/12/2015 – 09/12/2015 – NILOP, Islamabad, Pakistan.
International symposium on Lasers and their Applications

11/11/2019 – 14/11/2019 – Wuhan, China.
The international Photonics and Optoelectronics Meeting (POEM 2019 @ OSA)

Presentation on the "multi-wavelength colloidal quantum dot lasers".

19/04/2021 – 23/04/2021
Integrated Optics, Design, Devices, Systems and Applications VI; 117750Q (2021)

Presentation on the "2D distributed feedback lasing with colloidal quantum dots in photonic quasicrystals".

ORGANISATIONAL SKILLS

Research environment ability

As a Ph.D. researcher, I have the ability to start my research independently or can work in a group.

Experimental skills

I have the experience to design and fabricate microcavity lasers by interference lithography, holographic lithography, spin coating, dip coating, and drop-casting method. After fabrication, I have the ability to characterize microcavity lasers e.g. detecting emission properties, sensing properties, polarization properties, divergence angle, and so on.

Simulation skills

I have the ability to study different optical properties by using simulation software e.g., Optisystem, COMSOL, and Matlab.

HONOURS AND AWARDS

11/2020
Special Contribution Award – Beijing University of Technology, Beijing, China.

06/2021
Science Innovation Award – Beijing University of Technology, Beijing, China.

PUBLICATIONS

Multi-wavelength colloidal quantum dot lasers in distributed feedback cavities

https://doi.org/10.1007/s11432-019-2753-3 – 2020
A. Hayat, J. Tong, C. Chen, L. Niu, G. Aziz, T. Zhai, and X. Zhang, Science China Information Sciences 63 **(8)**, 1-7.

Multi-wavelength colloidal quantum dot lasers

https://doi.org/10.1364/LST.2019.LTh3E.1 – 2019
A. Hayat, J. Tong, G. Aziz, and T. Zhai, Laser Science and Technology, (Optical Society of America, 2019), LTh3E. 1.

Colloidal quantum dots lasing and coupling in 2D holographic photonic quasicrystals

https://doi.org/10.1364/OE.422288 – 2021
A. Hayat, L. Cui, H. Liang, S. Zhang, M. A. Khan, G. Aziz, and T. Zhai, Optic Express 29 **(10)**, 15145-15158

Two-dimensional distributed feedback lasing with colloidal quantum dots in photonic quasicrystals

https://doi.org/10.1117/12.2589242 – 2021
A. Hayat and T. Zhai, Integrated Optics: Design, Devices, Systems and Applications VI, (International Society for Optics and Photonics, 2021), 117750Q.

Single-Mode Lasing in Polymer Circular Gratings

https://doi.org/10.3390/ma14092318 – 2021
S. Chu, **A. Hayat**, F. Cao, and T. Zhai, Materials 14 **(9)**, 2318

Operating characteristics of high-order distributed-feedback polymer lasers

https://doi.org/10.3390/polym11020258 – 2019
P. Zhou, L. Niu, **A. Hayat**, F. Cao, T. Zhai, and X. Zhang, Polymers 11 **(2)**, 258

Hybrid lasing in a plasmonic cavity

https://doi.org/10.1364/OE.26.013383 – 2018
F. Cao, L. Niu, J. Tong, S. Li, **A. Hayat**, M. Wang, T. Zhai, and X. Zhang, Optic Express 26 **(10)**, 13383-13389.

Effects of cavity coupling on 1D defect modes: a theoretical model

https://doi.org/10.1364/OSAC.392895 – 2020
L. Cui, S. Zhang, L. Lv, Z. Xu, **A. Hayat**, and T. Zhai, OSA Continuum 3 **(6)**, 1408-1416.

Tunable WGM Laser Based on the Polymer Thermo-Optic Effect

https://doi.org/10.3390/polym13020205 – 2021
S. Zhang, T. Zhai, L. Cui, X. Shi, K. Ge, N. Liang, and **A. Hayat**, Polymers 13 **(2)**, 205

A theoretical model of quasicrystal resonators: a guided optimization

https://doi.org/10.3390/cryst11070749 – 2021
L. Cui, **A. Hayat**, L. Lv, Z. Xu, T. Zhai*, Crystals, 11**(7)**,749.

Large-Area Biocompatible Random Laser for Wearable Applications

https://doi.org/10.3390/nano11071809 – 2021
K. Ge, D. Guo, X. Ma, Z. Xu**, A. Hayat,** S. Li, and T. Zhai*, Nanomaterials, 11**(7)**, 1809.

RECOMMENDATIONS

Prof. Dr. Tianrui Zhai – Ph. D. Supervisor – trzhai@bjut.edu.cn – (+86) 13911208746
School of Physics and Optoelectronic, Faculty of Sciences, Beijing University of Technology, Beijing, China.

Prof. Dr. Jahan Akbar – M. Phil. Supervisor – jahan_akbar@gmail.com – (+92) 3418056987
Hazara University, Mansehra, Pakistan.

Prof. Dr. He Sailing – Research Director – sailing@zju.edu.cn – (+86) 057188206525
Room 201, East-Building No. 5, Zijingang Campus, Zhejiang University, Hangzhou, China