



Syed Abdul Basit Shah

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ABOUT ME

I hold a Master's degree in Nanotechnology and Materials Engineering and a PhD in Nanotechnology, allowing me to have research experience in the synthesis and characterization of quantum dots and 2D nanomaterials. My expertise includes tailoring nanostructures to achieve targeted functionalities, particularly in photocatalytic and photothermal applications.

I have extensive experience in designing and developing heterostructured nanomaterials to enhance charge separation and charge transport, leading to improved photocatalytic and photothermal performance. I am highly skilled in decorating quantum dots, nanocubes, and nanosheets onto titania-based nanostructures, including nanoparticles, nanotubes, and nanorods, as well as anodically grown titania nanotube arrays, to achieve strong synergistic effects.

I have had multiple research exchange experiences throughout my research career. During my PhD, I worked as a research exchange student at the University of Rostock and at Friedrich Alexander University Erlangen Nuremberg, where I collaborated on advanced nanomaterials research and expanded my international research experience. In addition, I have actively participated in international summer schools and scientific conferences focused on solar energy harvesting, photocatalysis, and green energy generation, which has strengthened my interdisciplinary perspective in sustainable nanotechnology research.

TECHNICAL EXPERIENCE

Colloidal synthesis and characterization of nanomaterials

Production of Titania nanotubes by anodic oxidation

Decoration of titania nanostructures with quantum dots and nanosheets

Photocatalytic and photothermal activities of nanoheterostructures

Characterization techniques

- UV-visible and absorption spectroscopy
- Steady state and time resolved photoemission spectroscopy
- X-ray diffraction
- Transmission electron microscopy
- Scanning electron microscopy
- Atomic force microscopy
- X-ray photoelectron spectroscopy
- Hall measurement equipment

EDUCATION AND TRAINING

01/10/2021 – 14/10/2025 Trieste, Italy

PH.D. NANOTECHNOLOGY Università degli studi di Trieste

Thesis title: Architected Materials for Functional Properties

Short Description: The modern world faces rising environmental challenges from fossil fuel reliance, driving greenhouse gas emissions and global warming. A promising solution is green energy, particularly clean fuels like hydrogen and CO₂-derived carbon-neutral fuels, produced sustainably via photocatalysis. Photocatalysis harnesses sunlight and semiconductors (notably Titania) to split water or convert CO₂, offering clean, scalable fuel production. This thesis investigates how Titania (TiO₂), when coupled with nanocubes, nanosheets, and quantum dots of perovskites and II–VI semiconductors, enhances solar absorption and hydrogen generation. As demonstrated in a 2024 *Small Science* publication, tailoring CsPbBr₃ nanocrystal surface chemistry via ligand exchange improves charge donor–acceptor interactions, providing insights toward scaling solar-to-fuel systems.

Supervisor: Prof. Vanni Lughì
Co-Supervisor: Prof. Christian Klinké

26/08/2018 – 28/07/2021 Topi, Pakistan

MASTER OF SCIENCE: NANOTECHNOLOGY AND MATERIALS ENGINEERING Ghulam Ishaq Khan Institute of Engineering Sciences and Technology

CGPA: 3.62 / 4.00

Thesis Title: Production and Characterization of Cr doped Indium Tin Oxide thin films by Magnetron co-sputtering for Optoelectronic and Thermoelectric applications

Short Description: Transparent materials having the ability to conduct electric current fall under the category of transparent conducting oxides. These materials are widely used in optoelectronic industry, usually in the form of thin films due to high increasing demand of electronic devices such as smart phones, laptop screens and solar panels as well as in sensors, making them more important to be studied extensively to attain superior properties. The world is moving towards more efficient and environmental friendly sources of energy harvesting, one of them is utilizing Thermoelectric materials which use waste heat as tool for generation of electric current. In this thesis, we developed thin films having the ability to act simultaneously as an optoelectronic and a thermoelectric material with enhanced efficiency, making them more efficient and reliable.

Supervisor: Prof. Rashid Ali

08/09/2013 – 27/09/2017 Peshawar, Pakistan

BACHELOR OF SCIENCE: MECHANICAL ENGINEERING University of Engineering and Technology Peshawar

CGPA: 2.90 / 4.00

Final Year Project: Engineering Design and Fabrication of Solar Photovoltaic Mounting and Tracking System

Short Description: Solar energy is a renewable energy source and out of all the other renewable energy sources, solar energy received the greatest attention in the decade of 1970s and has been the hub of much pressure since that time. Many regarded it as the solution for reducing the use of fossil and other not-so-clean fuels. As a result, solar energy has been the object of optimistic predictions to eventually replace all the current not-so-clean means of energy production. In this final year project, we designed and fabricated, an economical and efficient, 10 KVA solar tracking system, specifically for the location of city Peshawar (Pakistan). By using the solar tracking phenomenon, we minimized the angle of incidence between the incoming sunlight and the photovoltaic panel, hence maximizing the energy storage.

Supervisor: Dr. Umar Ibrahim

● WORK EXPERIENCE

SCIENTIFIC COLLABORATOR – UNIVERSITA DEGLI STUDI DI TRIESTE – 18/08/2025 – 31/12/2025 – TRIESTE, ITALY

Department: Department of Engineering and Architecture | **Address:** Piazzale Europa, 1, 34127, Trieste, Italy

My responsibilities included the synthesis, characterization, and implementation of II-VI semiconductor quantum dots, primarily cadmium and zinc-based, for photocatalytic and photothermal applications. Additionally, I was actively involved in synthesizing core and core-shell quantum dot structures and in decorating titanium dioxide nanostructures (nanoparticles and nanotubes) as well as wooden substrates with these quantum dots. The quantum-dot-loaded titania nanotubes formed heterostructures for photocatalytic uses, while quantum dots on wooden substrates were utilized for analyzing photothermal activities. In both cases, we successfully demonstrated the capabilities of these II-VI semiconductor quantum dots in their respective applications.

GRADUATE ASSISTANT – GHULAM ISHAQ KHAN INSTITUTE OF ENGINEERING SCIENCES AND TECHNOLOGY –

26/08/2018 – 24/12/2020 – TOPI, PAKISTAN

Department: Faculty of Materials and Chemical Engineering | **Email:** ismat@giki.edu.pk

TRAINEE MECHANICAL ENGINEER – ZKB ENGINEERS AND CONSTRUCTORS – 24/10/2017 – 21/05/2018 – LAHORE, PAKISTAN

Email: info@zkb.com.pk

INTERN – SHAWAN PHARMACEUTICALS – 16/07/2017 – 08/10/2017 – RAWAT, PAKISTAN

Business or Sector: Manufacturing | **Department:** Manufacturing, Project Management, Maintenance & Human Resource |
Email: Shawanpharm@yahoo.com

● RESEARCH EXPERIENCE AT FOREIGN INSTITUTIONS

01/01/2023 – 22/01/2024

Universität Rostock - Erasmus+ doctoral mobility

Nanostructures and Nanomaterials group - Institute of Physics

Synthesis and characterization of Methylammonium and Cesium based lead halide perovskite nanostructures
Development of nanostructured perovskite/TiO₂ heterostructures (donor-acceptor system) to study the electron extraction rate under varying surface conditions for optimal photocatalytic applications.

Doping of manganese in CsPbBr₃ perovskites nanocubes and nanocubes to delay the electron-hole recombination for efficient extraction of charge carriers by decorating them on titania nanoparticles and nanotubes, for use in photocatalytic applications

Supervisor: Prof. Christian Klink

01/09/2023 – 30/09/2023

University of Erlangen - Erasmus+ doctoral mobility

Department of Materials Science and Engineering

Growth of Titanium dioxide nanotubes by anodic oxidation

Synthesis of Titanium dioxide nanostructures

Development of quantum dots / Titanium dioxide based heterostructures

Photocatalytic Hydrogen Evolution through water splitting

Supervisor: Prof. Patrik Schmuki

01/10/2022 – 31/10/2022

Universität Rostock - Erasmus+ doctoral mobility

Nanostructures and Nanomaterials group - Institute of Physics

Colloidal synthesis and optoelectronic characterization of nanostructured perovskites (nanocubes/nanosheets) for photocatalytic applications.

Supervisor: Prof. Christian Klink

2019 – 2020

Sakarya University - Mevlana exchange program

Research and Development Application and Research Center (SARGEM)

CGPA: 89.5 / 100

Technical course studied: Advanced Nano-characterization Techniques

Language course studied: Turkish Language

Gained practical experience with magnetron sputtering coating equipment and material characterization techniques

Supervisor: Prof. Mehmet Oğuz GÜLER

● CONFERENCES, SUMMER SCHOOLS AND SEMINARS

27/05/2024 – 31/05/2024

European Materials Research Society - Strasbourg, France

Link <https://www.european-mrs.com/meetings/2024-spring-meeting>

23/09/2024 – 27/09/2024

International Conference on Light-Matter-Interactions at Interfaces- Rostock, Germany

Link <https://www.limati.uni-rostock.de/veranstaltungen/konferenzen/international-conference-limati-2024/>

04/06/2022 – 08/06/2022

Summer School on Energy "Giacomo Ciamician" - Bolzano, Italy

Link <https://www.awareenergy.it/>

30/07/2023 – 04/08/2023

Exciting nanostructures: Characterizing advanced confined systems - Bad Honnef, Germany

Link <https://www.dpg-physik.de/veranstaltungen/2023/bad-honnef-physics-school-exciting-nanostructures-characterizing-advanced-confined-systems>

13/07/2024 – 18/07/2024

Nanostructured Solid Liquid Interface School 2024 - Erice, Italy

Link <https://sites.unimi.it/nanosoli/>

01/09/2024 – 09/09/2024

International Quantsol Summer School on Photovoltaics and New Concepts of Quantum Solar Energy Conversion 2024 - Hirschegg, Austria

Link https://www.helmholtz-berlin.de/events/quantsol/index_en.html

12/02/2024 – 14/02/2024

PhD Days 2024 - Annual workshop - Trieste, Italy

● PUBLICATIONS

2025

[Recent Advances in Flexible Solar Cells; Materials, Fabrication, and Commercialization](#)

2025

[Photoluminescence Enhancement in CdSe/CdS Quantum Dot Colloidal Films Induced by Gold Nanoparticles \(AuNPs\)](#)

2024

[Tailoring Charge Donor-Acceptor Interaction in CsPbBr₃ Perovskite Nanocrystals through Ligand Exchange](#)

2022

[Effect of chromium-doping on structure and opto-electronics properties of nanostructured indium tin oxide thin films](#)

Engineered Heparinized Graphene QDs/HPEI-Polyamide Membrane for Bilirubin Removal via One Step Anti-coagulation

Under review - Advanced Materials Interfaces

● HONOURS AND AWARDS

Here is the list

- Government of Italy funded scholarship for Ph.D. in Nanotechnology at Università degli Studi di Trieste, Trieste, Italy, from 2021 - 2025
- Fully funded Erasmus+ doctoral mobility award during the Ph.D.
- Mevlana Exchange Program Scholarship to attend one semester as a Graduate Research Exchange Student at Sakarya University, Turkey, 2019-2020
- Merit Based Master Scholarship to study Nanotechnology and Materials Engineering at Ghulam Ishaq Khan Institute of Engineering Sciences and Technology, Pakistan, 2018-2021
- Merit Based Scholarship to pursue Bachelor in Mechanical Engineering at University of Engineering and Technology Peshawar, Pakistan, 2013-2017

● LANGUAGE SKILLS

IELTS Academic Score: 7.5

CEFR level: C1 (Proficient)

● RECOMMENDATIONS

Prof. Vanni Lughi Ph.D. supervisor

Organization: Università degli Studi di Trieste, Trieste, Italy

Email Vanni.lughi@dia.units.it

Prof. Christian Klinke Ph.D. co-supervisor

Organization: Universität Rostock, Rostock, Germany

Email Christian.klinke@uni-rostock.de