

Khushi Doshi

BIOLOGICAL SCIENCES (MASTERS) · CHEMICAL ENGINEERING (BACHELORS)

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Education

Birla Institute of Technology and Science, Pilani, Rajasthan

M.Sc. IN Biological Sciences

GPA: 9.01 (Dept.) / 8.34 (Overall)

Aug. '18 – July '23

Birla Institute of Technology and Science, Pilani, Rajasthan

B.E. IN Chemical Engineering

GPA: 8.68 (Dept.) / 8.34 (Overall)

Aug. '18 – July '23

Publications & Pre-prints

Ultrasensitive and Long-Lasting Luminescence Cascade Sensor for Point-of-Care Viral Pathogen Detection

S. KIM, G. CHO, J. LEE, **KHUSHI DOSHI**, S. GHARPURE, H. CHEN, J.M. HARDIE, H. SHAFIEE

In Submission at Nature Biomedical Engineering



2023

COVID-19 Pandemic: Mechanism, Diagnosis and Treatment

V. KUMAR, **KHUSHI DOSHI**, W. H. KHAN, ANURAG SINGH RATHORE

Journal of Chemical Technology & Biotechnology



2020

Work Experience

Ultrasensitive Antigen-Based Point-of-Care Diagnostics

PROF. HADI SHAFIEE | HARVARD MEDICAL SCHOOL | BRIGHAM AND WOMEN'S HOSPITAL

Thesis

July '22 – June '23

- Developed and optimized LUCAS- LUMinescence CAscade-based Sensor, an enzyme cascade system capable of rapidly detecting analytes with ultrahigh sensitivity and prolonged bioluminescence
- Actively engaged in troubleshooting the challenges faced during assay development. Helped implement it on a fully automated, portable and user-friendly platform featuring a microfluidic cartridge with pre-loaded reagents and a cost-effective reader
- Implemented the protocol for testing HBV. Selected antibody pairs and target antigen and carried out bioconjugation reactions of nanoparticles and immunogens. Achieved a limit of detection of 0.4 fM for HBV surface antigen and a clinical sensitivity of 100% and specificity of 92% for patient samples
- Achieved over 95% accuracy in the qualitative classification of 177 viral-infected patient samples and 50 viral-spiked serum samples, for viral pathogens including SARS-CoV-2, HIV, HBV, and HCV

Microfluidic Platforms for Droplet Synthesis

PROF. UDAY KOMPPELLA | UNIVERSITY OF COLORADO DENVER

Remote Internship

June '21 – Aug '21

- Designed a solvent extraction channel, with 4 inlets, a fusion chamber and a collection reservoir. Simulated the mixing of silicone oil, water and DCM in the chip to generate droplets in Ansys Fluent
- Performed the mixing of silicone oil and water in a T-chip. Modified the design and added a laminated water stream in order to extract droplets from the oil phase and collect them in aqueous phase
- Created a parametric model of a 3-inlet microfluidic channel in AutoCAD. Simulated the mixing of aqueous PVA and PLGA dissolved in acetone by varying flow parameters in Autodesk CFD

Fruit Fly – Biology and Behavior

PROF. ADELAINE LEUNG | UNIVERSITY OF SASKATCHEWAN

Remote Internship

June '21 – Aug. '21

- Conducted manual analysis of fly behavioral videos, documenting copulation periods, alignment during copulation, and unique postures. Also performed the above analysis utilizing Caltech FlyTracker software
- Developed a MATLAB code that processed the output files from the FlyTracker software, analyzing the start and end times of copulation based on a threshold value of distance between two flies
- Worked with JAABA, a machine learning-based behavioral annotator, to understand how to train classifiers for automated analysis of fly behaviors

Prototyping of Portable Centrifuge and Reagent Strip Quantification

PROF. ROHIT SRIVASTAVA | INDIAN INSTITUTE OF TECHNOLOGY BOMBAY

Internship

May '19 – July '19

- Designed a 3-D model of a lateral flow assay reader and portable centrifuge of 10,000 RPM using AutoCAD and 3-D printed the designs using the Ultimaker-3 printer as a part of a bigger project for remote healthcare
- Resolved the challenges of unwanted vibrational stresses using absorber rubber pads and measured the centrifuge speed by integrating a photosensor and frequency-to-analog converter
- Prepared reagent strips and solutions of albumin, creatinine and glucose and quantified them using light sensors

Skills

Wet Lab

Mammalian Cell Culture (Seeding, Counting, Splitting, Revival, Drug Treatment, Cryopreservation), HTRF, ELISA, WRN Helicase Assay, CTG Cytotoxicity Assay, Gel Electrophoresis, Molecular Cloning Techniques, Biosafety and Handling Patient Samples (BSL2+ Compliance), Physiological and Biochemical Characterization of Microbial Cultures

Instruments

Spectrometers (UV-Vis, Fluorescence, FT-IR), TLC, Gas Chromatography, Luminometer

Software

ImageJ, AutoCAD, Ansys Fluent, Basic Programming (MATLAB, Python, C), Serial Cloner Software

Selected Academic Projects

Genetic Engineering Techniques

[Lab Course](#)

PROF. PRABHAT N. JHA | BITS PILANI

Jan. '20 – May '20

- Isolation of plasmid from pQE60 clone of E. coli by boiling lysis, alkaline lysis and kit based methods, restriction-digestion of isolated plasmid and analysis using agarose gel electrophoresis followed by DNA extraction, purification and quantification using Nanodrop
- Performed competent cells preparation of E. coli, transformation using PuC19 vector followed by DNA ligation, creation of recombinant clones and their selection by blue-white screening

Biomarkers of Ovarian Cancer

[Design Project](#)

PROF. RAJDEEP CHOWDHURY | BITS PILANI

Aug. '20 – Dec. '20

- Undertook an in-depth study on ovarian cancer, analyzing treatment approaches, drug repurposing strategies, mechanisms of drug tolerance and resistance, collateral sensitivity and FDA-approved biomarkers used for detection
- Worked on identifying molecular signatures and created database for the machine learning team, enabling them to develop a cognitive model that can predict ovarian cancer and the patient's response to therapy

Comparative Genomics of the ATR Gene

[Lab Course](#)

PROF. SHIBASISH CHOWDHURY | BITS PILANI

Jan. '21 – May '21

- Analyzed the ATR gene from various organisms. Wrote python scripts to examine gene content, restriction enzymes sites and start/stop codons. Used GOR4, Predator and Predict Protein to predict and visualize the secondary and 3D protein structures
- Predicted structural and functional regions using GENSCAN and used ORF Finder to obtain the ORFs and protein sequences
- Performed pairwise and multisequence alignments (EMBOSS, BLAST, Clustal Omega) and phylogenetic tree constructions (MEGA-X) to gain insights into evolutionary and functional relationships and sequence conservation among organisms

Achievements

Aug. '22	IPCD Travel Grant Award , One of the 10 students in the '23 batch to receive Grant for Off-Campus Thesis	BITS Pilani
Jan. '20	MCN Scholarship , Awarded the Merit-cum-Need Scholarship to cover 25% of tuition for the Semester	BITS Pilani
2018	Dual Degree Program Selection , Selected for B.E. Chemical with MSc. Biological Sciences at BITS Pilani, Pilani Campus (Acceptance Rate 1.47%)	BITS Pilani
2015	Dr. Homi Bhabha Balvaidnyanik Competition , Earned a Silver Medal at the State Level	High School

Certified Courses

Aug. '20	Biology Meets Programming : Bioinformatics for Beginners , UC San Diego	Coursera
Jun. '20	MATLAB Onramp , MathWorks	MathWorks
May. '20	Introduction to the Biology of Cancer , Johns Hopkins University	Coursera