Vikash Meghwal

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Education

2019 – 2024 **B.S.-M.S. Dual Degree, Chemical Sciences in Chemistry, IIT Kanpur**
IIT Kanpur, Uttar Pradesh, India 208016.
Master's ***GPA: 8.94/10.0***
Bachelor's ***GPA: 7.10/10.0***

2017 – 2018 **All India Senior School Certificate Examination, CBSE**
Lawrence & Mayo Public School, Ajmer, Rajasthan 305001.

2015 – 2016 **All India Secondary School Examination, JKBOSE**
Bharti Public High School, Jammu and Kashmir 181133.

Master's Project

Jan'24-Present **Supervisor: Prof. Thiruvancheril G. Gopakumar, Molecular Functional Materials Research Group, Dept. of Chemistry, IIT Kanpur** *Lab Project work* Website
Research Summary: Enhancing the Electronic-Coupling and Band Gap Tunability in Ferrocenyl Molecular Ultra-Thin Film by Palladium (Pd) & Copper (Cu) Doping.
1. We have developed an ultra-thin molecular film using drop casting method where dopants are introduced at specific ligand sites. We formed semi-conducting surface-confined metal–organic networks **(SMONs)** with metals on highly oriented pyrolytic graphite **(HOPG)** surface at ambient conditions.
2. Analyzed the Conductive AFM on the Surface of Two ferrocene (Fc) functionalized molecules, 3-ferrocenyl propanoic acid (FcC3) and 5-ferrocenyl pentadienoic acid (FcC5). Used software like **Igor Pro, Agilent AFM, WSxM5, & Origin.**
3. Studied the properties using **Self Assembly, Metal Doping (Pd & Cu), XPS Analysis**.
4. Used GaussView, Putty, WinSCP, DS-Viewer Pro.
5. Calculated density of state (DOS), total energy using **Quantumwise ATK-DFT** simulations.

Internships

Jan'24-April'24 **Armatrix, An Industrial And Defence Robotic, IIT Kanpur** Official Website
Full stack developer Intern
1. Developed a fully functional website using ReactJs, incorporating CSS Tailwind for styling.
2. Implemented an efficient email fetching system utilizing Email Js.
3. Maintained and updated the website as per company requirements, ensuring optimal functionality.
4. Ensured seamless responsiveness across various screen sizes, delivering a bug-free user experience.
5. Responsible for end-to-end website development, management over the Hostinger hosting platform.

Jan'23-Nov'23 **Supervisor: Prof. Pratik Sen, Biophysical Chemistry Research Group, Dept. of Chemistry, IIT Kanpur** *Lab Project* | ***SURGE*** *Program (Summer Research Intern)* Website
Summary: Elucidation of the Structure and Dynamics of Synergistic Mixed Solvent Systems.
Learning Work: *In this research project we have focused on investigating the structure and dynamics of synergistic mixed solvent systems through distillation, NMR spectroscopy, and data analysis on the three system (N, N-dimethylformamide (DMF), N-dimethylformamide (NMF) & Formamide).*
Skills Acquired: *1. Conducted in-depth investigations using* ***^{1}H NMR*** *and absorption spectroscopy to characterize solvent interactions.*
2. Deployed ***vacuum distillation*** *technique to purify organic solvents.*
3. Applied ***absorption, emission spectroscopy*** *to understand the behavior of solvent system.*
4. Utilized software tools like ***IGOR Pro*** *and* ***Origin*** *for data analysis and visualization.*
5. Performed Hydrophobicity trend graph analysis in ***python.***

Research Areas & Subject Interest

Molecular materials, Surface science, Scanning Probe Microscopy, Scanning Tunneling Microscopy (STM), Atomic Force Microscopy (AFM), X-ray Photo-electron spectroscopy (XPS), 2D-FFT, Spin Coating, Vacuum distillation, NMR, Absorption spectroscopy, Emission spectroscopy Surface and Material Sciences, Quantum-Chemistry, Physical-Chemistry, Solid State, 2D materials, Molecular-Simulation, Semiconductors, & Programming in CPP.

Conferences and Awards

1. "Students-Undergraduate Research Graduate Excellence (SURGE)-2023", IIT Kanpur, poster presentation.
2. "International Online Olympiad GRE & Tofel-2022", Galvanize, participation.
3. "Advances in Spectroscopy, Catalysis, and Synthesis-2021", IIT Kanpur, participation.
4. "State Level Science Exhibition-2015", INSPIRE Award Scheme, Govt. of Jammu & Kashmir, participation.

Undergraduate Research Project (UGP)

Jan'22-May'22

Supervisor: Prof. Nagma Parveen Research Group, Chemical Biology (Bio-Nanoparticle Lab), Dept. of Chemistry, IIT Kanpur *Lab Project* Website

Research Summary: Studying the SARS-CoV-2 fusion in detail using an opportunistic model for the fusing of the coronavirus membrane. Receptor binding and priming of the spike protein of SARS-CoV-2 for membrane fusion.

Future Work: *To create medicines for human consumption and vaccines to combat infections and disease. And use this knowledge to create nanoparticle medicines and enough adoptable vaccines.*

Learning from lab*: Viruses and Binding fusion in SARS-MERS Covid.*

Course Work Assignments

Jan'23-May'23

Supervisor: Prof. Prof. Mainak Sadhukhan, IIT Kanpur

Title: Numerical Methods in Fortran Programming Fortran

1. Implemented Lorenz System solved by ***Euler forward*** *and* ***Runge Kutta-4*** *methods and compared using 3D animated plot and X-Z graph with appropriate given points, demonstrating variation in the 3D graphical model plots.*

2. Implemented ***Gauss Legendre Polynomial, Monte Carlo, Trapezoidal, and Simpson's Rule*** *for integration. Created the terminal Program for all these models.*

3. Used ***Ising Model*** *to stabilize Energy and Temperature Dependencies, exploring Specific heat in constant volume and Magnetic momentum Magnetisation determination.*

4. Solved the Schrodinger Wave Function & Density Matrix.

May'21-July'21

Supervisor: Prof. Anish Upadhyaya, IIT Kanpur

Title: Manufactured a model of The Cantilever ToolBox

We have worked on the manufacturing process, as well as designing the structure & components. Also created 3D model using Fusion360 Designing Tool, and finalised the cost of the manufacturing process.

Self-Project

Full Stack E-commerce + CMS

1. Next Js 13 Application created fully functional E-commerce App having Admin and Client Platform. 2. Used Latest web Development technologies including React, Talwind, Prisma, MangoDB, MySQL, PlanetScale, Stripe, NextAuth, App Router & Deployed on Vercel. Admin View Client View

Organised Automation Website

Website: Angular (a web framework), Electron Js, and web development tools were used. Console functionality also embedded. Website Link

Comic Creator Web App

Using React Web Application to developed Web Application that allows User to create & share 10-panel Comic strip. Comic is generated by input text, that fetch images from text-to-image API using a provided API key. Link

Server and Client App

Using Android-studio, created a Server and Client application that enables the storage of data on the Google Fire-base Framework.

Skills

Programming Languages	C/C++, Fortran Programming, Python…
Android Development	Android Studio, Flutter, Kotlin, and Postman API.
Developer Tools	LaTeX, Markdown, Html, CSS, Git, VS Code, Visual Studio, Sublime Text Editor, Jupiter Notebook, Colab.
Frameworks	ElectronJs, ReactJs, NodeJs, Angular Js.
Operating System/ Terminal	Knowledge of Linux, Windows & Mac environments and APIs, CMD, Power Shell.
Misc.	Fusion360, PowerPoint, Adobe Photoshop, MS-Word, Adobe Illustrator, Auto CAD, Overleaf, MongoDB, GNU Plot, Linux Shell, Avogadro, Orca.

Positions of Responsibility

2021-22 **Council Secretary Exhibition** **IIT Kanpur**
Responsibility for Exhibition Planning and Execution

2020-21 **Techkriti RoboGames Senior Executive** **IIT Kanpur**
Prepared a database of various colleges and contact them as well as convince them to Participate in the RoboGames RoboCaAD Manoeuvre using abstract calling.

Senior Secretary Chess Club **IIT Kanpur**
Organizes Chess tournaments for the campus community. Conducted various events on Lichess

2020-20 **Secretary | Ritambhara | Antaragni** **IIT Kanpur**
Prepared a database of various fashion giants and We contacted them and convince them to sponsor our event. Contacted various colleges and their fashion societies and increased the participation in the event.

2019-20 **Volunteer | Ritambhara | Antaragni** **IIT Kanpur**
Assist the Senior Secretary in organizing an event while Antaragni, Pearl Academy Delhi. Volunteered for the Hospitality wing of Antaragni-IIT Kanpur's annual cultural fest.