

## CURRICULUM VITAE

### **SHWETA DIXIT, PhD**

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### **Academic Profile:**

- **Ph.D. (Chemical Engineering):** Department of Chemical Engineering, Indian Institute of Technology Kanpur, Kanpur, Uttar Pradesh, INDIA (2020)
- **Thesis title:** “*Development of Recombinant Bacteria for Degradation of Hazardous Sulphonated Azo Dyes*”
- **Supervisor: Professor Sanjeev Garg**, Department of Chemical Engineering, Indian Institute of Technology Kanpur, Kanpur 208016, Uttar Pradesh INDIA
- **M. Tech. (Biochemical Engineering):** School of Biochemical Engineering, Indian Institute of Technology BHU, Varanasi, Uttar Pradesh, INDIA (2011)
- **Thesis title:** “*Study on the Controlled Release of Drug from Biodegradable Polymer*”
- **Supervisor: Professor R.M. Banik**, School of Biochemical Engineering, Indian Institute of Technology BHU, Varanasi, Uttar Pradesh, INDIA
- **M.Sc. (Biotechnology):** Institute of Biosciences & Biotechnology (IBSBT), Chhatrapati Shahu Ji Maharaj University, Kanpur, Uttar Pradesh, INDIA (2009)
- **Project title:** “*Relative Quantification of SOCS3 and STAT3 Gene Expression during Asthma Pathogenesis by using Real Time PCR*” (Three months project, 9 June-9 September 2008)
- **Supervisor: Dr. B.N. Paul** (Scientist ‘E-II’), Head of Immunobiology Division, Indian Institute of Toxicology Research (IITR), Lucknow, Uttar Pradesh, INDIA

### **Research Summary:**

My doctoral research was focused on the development of recombinant bacterium for bioremediation of industrial wastewater at source point application. In this study, we focused on organic pollutant, azo dyes, mainly used in textile industries and known potent carcinogens. A facultative bacterium was isolated and purified from the sludge of a local dyeing industry which could utilize azo dyes upto 1000 mg l<sup>-1</sup> concentration as a source of carbon and energy. The isolated bacterium was identified as *Klebsiella pneumoniae* that could decolorize six selected sulfonated (mono-, di- and tri-substituted) azo dyes efficiently under static conditions and also mineralizes their metabolites (aromatic amines) under aerobic conditions. Based on the metabolite analyses using UV-Vis spectroscopy and HPLC,

a degradation pathway of MO was hypothesized where MO was decolorized to produce 4-ABS and N, N-dimethyl-P-phenylenediamine under static condition. Azoreductase encoding gene was cloned in *E. coli* DH5 $\alpha$  and expressed using pET-28b vector in *E. coli* BL-21 cells. The recombinant *E. coli* BL-21 was observed to decolorize 100 mg ml<sup>-1</sup> of MO within 3 h in the presence of NADH. The periplasmic azoreductase was found to be involved in extracellular decolorization of azo dyes. The expressed recombinant azoreductase was purified using standard methods. Gel filtration chromatography established that the purified azoreductase had a molecular mass of 23 kDa and was present in tetrameric form. The purified azoreductase showed its maximum activity at 40°C and pH 8.0. The apparent kinetic parameters,  $appK_m$  and  $appV_{max}$ , for azoreductase were calculated to be 17.18  $\mu$ M and 0.08 min<sup>-1</sup>, respectively. The azoreductase cloning from *Klebsiella pneumoniae* was reported for the first time. These results provide the lead for the development of a source point application for bioremediation in near future.

### Technical Expertise:

- **Molecular biology:** Recombinant DNA Technology, primer design, PCR techniques, gene cloning, gene expression, RT-PCR, agarose gel electrophoresis and other basic molecular biology techniques for DNA analysis.
- **Techniques for protein/enzyme analyses:** Purification of expressed protein from a recombinant bacterial system, enzyme characterization, different enzyme purification techniques (Ammonium sulphate precipitation, Dialysis, Ion-exchange chromatography, Gel filtration chromatography, Affinity chromatography), SDS-PAGE, enzyme characterization techniques (protein estimation, enzyme assay, parameter optimization, kinetic studies etc.) and western blotting.
- **Basic microbiology techniques:** Bacterial culture handling, chromosomal DNA isolation, plasmid isolation, plasmid production in *E. coli*, plasmid purification from *E. coli*, isolation, purification and characterization of a bacterium from wastewater sludge.
- **Analytical Instruments:** UV-vis spectrophotometer, HPLC, GC-MS, techniques for polymer scaffold fabrication and its characterization (SEM, FT-IR and TGA/DSC).
- **Computer acquaintance:** Extensive working experience in MS Office (Word, Power point, Excel), working knowledge of Adobe Photoshop, MS Paint, Reference Managers.
- **Advance Diploma in Computer Application (one year):** FOC, DOS, Windows, MS-Office, Html, CorelDraw, PageMaker etc.

### Awards, Fellowships and Academic Achievements:

- Awarded an **International Travel Grant (2018)** from Science and Engineering Research Board (SERB), Department of Science and Technology, New Delhi, India.
- Awarded an **International Travel Grant (2017)** from Department of Biotechnology (DBT), Government of India, New Delhi, India (not utilized).
- Awarded **Best Paper Award** in International Conference CHEMCON-2017 on “Versatility of Chemical Engineering to Meet Societal Challenges” held at Haldia

Institute of Technology, Haldia, India (December 27–30, 2017).

- Awarded **Best Poster Award** in ICBB-2014 on “*Synthesis and Characterization of Gellan Gum Scaffold*” organized by ICSCCB, Pune, India.
- **Fellowship (2011-2016)** from Ministry of Education (formerly MHRD), Government of India, New Delhi, India.
- Member of **Counseling Service (CS)**, IIT Kanpur, 2014, India.
- **Teaching Assistant (TA)** at the Chemical Engineering Department, IIT Kanpur, India.
- Qualified Graduate Aptitude Test in Engineering (**GATE-2011**) (Life Science) with **AIR 39** and **Gate Score 597**, India.
- Qualified Graduate Aptitude Test in Engineering (**GATE-2009**) (Life Science) with **AIR 264** and **Gate Score 511**, India.
- **Gold Medalist (1<sup>st</sup> Rank)** in **M.Tech.** (Biochemical Engineering) from I.I.T. BHU, Varanasi, India.

### Publications:

1. **Dixit, S., & Garg, S.** (2018). “Biodegradation of environmentally hazardous azo dyes and aromatic amines using *Klebsiella pneumoniae*”. *Journal of Environmental Engineering*, 144(6), 04018035-1-11, [https://doi.org/10.1061/\(ASCE\)EE.1943-7870.0001353](https://doi.org/10.1061/(ASCE)EE.1943-7870.0001353).
2. **Dixit, S., & Garg, S.** (2019). “Development of an efficient recombinant bacterium and its application in the degradation of environmentally hazardous azo dyes”. *International Journal of Environmental Science and Technology*, 16(11), 7137-7146, <https://doi.org/10.1007/s13762-018-2054-7>.
3. **Dixit, S., & Garg, S.** (2020). “Enzymatic degradation of sulphonated azo dye using purified azoreductase from facultative *Klebsiella pneumoniae*”. *Folia Microbiologica*, 1-7, <https://doi.org/10.1007/s12223-020-00824-2>.

### Paper Presented in International Conferences:

- Presented paper at **256<sup>th</sup> ACS-2018 Annual Meeting and Exposition** on “Nanoscience, Nanotechnology & Beyond” held at Boston, MA, USA, August 19-23, 2018.
- Presented paper at **CHEMCON-2017** on “Versatility of Chemical Engineering to Meet Societal Challenges” held at Haldia Institute of Technology, Haldia, India, December 27-30, 2017. **Awarded best paper award.**
- Presented paper at **AMI-2017** on “Microbes for Sustainable Development: Scope & Applications” held at Babasaheb Bhimrao Ambedkar University, Lucknow, India, November 16-19, 2017.
- Presented poster at **ICMG-2016** on “Metals in Genetics, Chemical Biology and Therapeutics” held at Indian Institute of Science, Bangalore, India, February 17-20, 2016.
- Presented paper at **SusChemE-2015** on “Sustainable Chemistry & Engineering” held at Hotel Lalit, Mumbai, India, October 8-9, 2015.
- Presented paper at **CHEMCON-2014** on “Chemical Engineering-Emerging Dimensions and Challenges Ahead” held at Punjab University, Chandigarh, India, December 27-30, 2014.
- Presented poster at **ICBB-2014** on “Biotechnology and Bioinformatics” held at Yashada

Auditorium, Pune, India, February 1-2, 2014. **Awarded best poster award.**

- Presented poster at **RAPS-2010** on “Recent Advances in Pharmaceutical Sciences” held at Department of Pharmaceutical Engineering and Technology, IIT BHU, Varanasi, India, December 22-23, 2010.

#### Personal Details:

Date of Birth:	18 <sup>th</sup> June 1985
Email ID:	shwetad@iitk.ac.in shwetadixit18@gmail.com
Gender:	Female
Nationality:	Indian
Marital Status:	Married
Spouse Name:	Mr. Saurabh Kumar Agnihotri
Father’s Name:	(Late) Mr. Devendra Kumar Dixit
Mother’s Name:	Mrs. Usha Dixit
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#### References:

##### **Professor Sanjeev Garg**

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##### **Professor Raju Kumar Gupta**

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**DECLARATION:** I, hereby declare that all the statements mentioned above are true and authentic to the best of my knowledge.



**Shweta Dixit**