

# Mihir N. Bhagat

## Contact Details

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## Objectives

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My career objective is to identify shortcomings in current chemical processes which adversely affect profit, safety and the environment. I wish to overcome such problems using research and develop solutions which directly create value for society. My ultimate aim would be to create an organization which commercializes such research.

## Publications

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### Published manuscripts

- Badve, M., Bhagat, M. and Pandit, A.; (2015). Microbial disinfection of seawater using hydrodynamic cavitation. *Separation and Purification Technology*, 151, pp.31-38.
- Bhagat, M., Badve, M. and Pandit, A. (2015).; Synergistic degradation of 4-nitrophenol using hydrodynamic cavitation in combination with hydrogen peroxide. *International Journal of Sustainable Water Environmental Systems*, 8(1), (Article accepted for publication).

### Manuscripts in progress

- Bhagat, M.; Microreactors in intermediate manufacture-recent developments and future directions. *Chemical Engineering Communications*-Manuscript under corrections.
- Bhagat, M., Badve, M., Pandit, A.; Homogenization and pasteurization of fresh buffalo milk using hydrodynamic cavitation-Manuscript under preparation.
- Shaikh M. Mobin, Bhagat, M.; Ferrocene carboxaldehyde and ferrocene carboxylic acid schiff bases for transition metal complexes-Manuscript under preparation.

### Conference abstracts

- Bhagat, M., Badve, M. and Pandit, A.; (2015). Degradation of p-nitrophenol using hydrodynamic cavitation: Presented at the 8<sup>th</sup> International Undergraduate Research Symposium (IURS 8) held in Goa, India from January 5-9, 2015.

## Research Experience

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Oct. 2013-  
Feb. 2016

Undergraduate Researcher at Institute of Chemical Technology, Mumbai, India

Homogenization and pasteurization of milk using Hydrodynamic Cavitation(HC)

PI: Prof. A.B. Pandit

Milk disinfection characteristics of HC were successfully studied and homogenization experiments are currently underway. Complete pasteurization was achieved using  $H_2O_2$  and HC, under mild heating. Small-scale dairies have been approached to explore commercial possibilities for this project.

Synergistic degradation of 4-nitrophenol using hydrodynamic cavitation and  $H_2O_2$

PI: Prof. A.B. Pandit

The utility of HC for treating 4-nitrophenol, a toxic and persistent pollutant, was studied. We observed a synergistic interaction between HC and  $H_2O_2$  which resulted in complete degradation of 4-nitrophenol within short treatment times.

Ballast water disinfection using hydrodynamic cavitation

PI: Prof. A.B. Pandit

Ballast water, a bio-invader, was treated using HC. Excellent disinfection levels were achieved when HC was used in presence of oxidizers such as NaClO. This technology holds commercial promise, though a prior approval from the International Maritime Organization is required for implementation.

July 2015-  
May 2016

Undergraduate Student at Institute of Chemical Technology, Mumbai, India

Utility of Microreactors in Dyestuff Manufacture

For my UG seminar, I performed a critical review on the present state of Microreactor technology in dye and pigment chemistry. The usage of microreactors has led to improved yields, purities and reaction times but clogging and high capital costs need to be addressed in future research.

Novel methods for synthesizing 4-amino-2-chlorophenol  
Working towards my UG thesis, I developed a one-pot method for synthesizing 4-amino-2-chlorophenol, a toxic chemical which is used in the production of many dyes and pigments. Though this route must be optimized further, it holds promise in reducing effluents and capital costs in the production of the said compound.

- June-July 2015 | Summer Research Intern at Jaroslav Cerni Institute in Belgrade, Serbia  
Analysis of surface, ground and effluent water in the Republic of Serbia  
PI: Mr. Miodrag Milovanovic, Asst. Director.  
Water samples from Serbian rivers, lakes and wells, affected by industrial effluents, were characterized. The results of this study would be utilized to identify and address shortcomings in existing effluent treatment processes.
- June-July 2014 | Summer Research Intern at University of Chemistry and Technology Prague, Czech Republic  
Synthesis of novel glycomimetics as potential ligands for lectin-type receptors  
PI: Prof. Jitka Moravcova, FRSc.  
My work on Carbohydrate chemistry involved the development of molecules which mimic sugars and alter the response of lectin receptors in human immune systems. This research has potential applications in drug delivery and disease inhibition.
- May-Jul 2013 | IITI-Agilent Technologies Summer Fellow at Indian Institute of Technology, Indore, India  
Synthesis of novel ferrocene schiff bases as ligands for transition metal complexes  
PI: Prof. M.M. Shaikh.  
My work involved the synthesis and characterization of a novel ferrocene-based ligand. Future scope of this work includes its applications in oxidation catalysts based on transition metals.
- Development of carbon-paste electrodes for cyclic voltammetry  
PI: Prof. M.M. Shaikh.  
I was involved in developing carbon-paste electrodes based on the novel ligand and investigating their potential applications in cyclic voltammetry.

## Work Experience

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- Apr. 2014- Apr. 2015 | Secretary (Student Editor) at Bombay Technologist  
As the secretary of my institute research journal, I was responsible for receiving research/review articles, sending them for peer review and publishing accepted papers. Additionally, I transformed the journal from a print edition to a fully electronic format which led to the journal receiving its first citation in recent times. Moreover, our team introduced the Bombay Technologist Undergraduate Research Program-a novel, structured UG research program, for which we received over 150 applications for 26 positions.
- Dec. 2014- Feb. 2015 | Data Analyst at ExInvent International  
I interned at ExInvent International, a startup aiming to provide a platform for trading excess industry inventory. My task on the job was to develop a database of tactical chemicals which faced fluctuations in demand and supply, so that these chemicals could be shortlisted for trading.

## Education

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- Aug. 2016- Present | Doctor of Philosophy, Chemical Engineering  
Northwestern University, Evanston, USA
- July 2012- June 2016 | Bachelor of Technology (Dyestuff Technology)  
Institute of Chemical Technology, Mumbai, India  
CGPA: 9.06/10

## Scholarships and Certificates

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- Mar. 2016 | Prof. S. Seshadri Prize in 2016 for scoring the highest marks in Third Year B.Tech. (Dyes)
- Jul. 2015 | Dyestuffs Manufacturers association of India award for achieving the first rank in the department
- Mar. 2015 | Prof. S. Seshadri Prize in 2015 for scoring the highest marks in Second Year B.Tech. (Dyes)
- Feb. 2015 | Received the J.R.D Tata scholarship for engineering students in the academic year 2014-15
- Aug. 2014 | Dyestuffs Manufacturers association of India award for achieving the first rank in the department
- May 2013 | IIT Indore-Agilent Technologies summer research fellowship