Chemical Engineering Department

SCHOOL OF TECHNOLOGY
PANDIT DEENDAYAL PETROLEUM UNIVERSITY

NEWSLETTER

September to December 2020

CONTENTS

FEATURE ARTICLE

Intellectual Property Right (IPR) – Need of the Hour

By: Dr. Anurag A. Gupta

VISION

To impart quality education in an industry research driven modules to motivate the young chemical engineers for creating knowledge wealth to help generate employability following professional ethics and focus towards a sustainable environment and benefits to the society.

MISSION

- To facilitate the chemical engineering students with the state-of-the-art facilities with focus on skill development, creativity, innovation and enhancing leadership qualities.
- To nurture creative minds through mentoring, quality teaching & research for building a value based sustainable society.
- To work in unison with the national and international level academic and industrial partners by venturing into collaborations to tackle problems of bigger interest to society.
- To build an encouraging environment for the young faculties and staff by providing safe work culture, transparency, professional ethics and accountability that will empower them to lead the department in right spirit.
- To inculcate the culture of continuous learning among the faculties by encouraging them to participate in a professional development programs and envisage to address the social, economic and environmental problems.

EDITORIAL TEAM

Dr. Rajat Saxena (Faculty Co-ordinator)
Dr. Abhishek Yadav (Faculty Co-ordinator)
Mr. Manish Shewaramani (Staff Co-ordinator)
Mr. Vandan Dudhat (Student Co-ordinator)
Mr. Poojan Chaklasiya (Student Co-ordinator)

MESSAGE

Prof. Sunil Khanna
Director, SOT, PDPU

From the Director's desk....

Dear Colleagues and Students:

The advent of circular economy in Chemical systems is leading to the development of an economic system aimed at minimizing waste and making the most of resources. It replaces the end-of-life concept with restoration, shifts towards the use of renewable energy, eliminates the use of toxic chemicals, which impair reuse and return to the biosphere, and aims for the elimination of waste through the superior design of materials, products, systems and business models. The drivers of the circular economy would be the advances in computational modelling, data analytics, optimization tools, and next-generation bio-based catalysts to produce fuels and chemicals at scale with lower emissions.

As we @ PDPU embark on this journey of circular economy in Chemical Engineering, I am Happy to Introduce the next issue of the Newsletter which not only share with all its readers the latest news and developments in the Department of Chemical Engineering but would also be sensitizing all of us on the latest trends and developments in the adoption of the circular economy.

The limitless power of technology to do good and the conviction of my faculty colleagues and students that the golden age is ahead of us - and not behind us – brings about the best in all of us which is reflected in their achievements.

Compliments to the editorial team for their passion for perfection and unbound creativity which makes me always look forward to the next edition of the Newsletter.

From the HOD's desk....

It gives me immense pleasure to share newsletter of the Chemical Engineering Dept., Sept - Dec 2020. The Department of Chemical Engineering at PDPU, Gandhinagar is one of the premier departments that provides a unique educational and research environment. We have a major emphasis on interdisciplinary and industrial collaborations. Our primary missions are to educate undergraduate and graduate students, and to discover and disseminate knowledge through research. The Department is committed to achieving excellence in these activities, and evaluates the success and leadership of its programs using the highest standards of quality, innovation, & visibility, while at the same time providing a friendly and supportive atmosphere.

Dr. Swapnil Dharaskar
Head, Chemical Engineering

FACULTY BOARD

PUBLICATIONS

Journal Publications

- Yogendra Kumar, **Abhishek K. Gupta**, U. Natarajan, Conformational studies of stereoregular isomers of poly(acrylic acid) in dilute aqueous solutions using molecular dynamics simulation study. Molecular Simulation. 2020, 46(18), 1483-1499.
- **Abhishek K. Gupta**, Salt Ions Induced Transport Properties Of Poly(Methacrylic Acid) PMA In Aqueous Solutions Studied By Molecular Dynamics Simulations. Materials Today: Proceedings (Accepted, In Press)
- **S. Balchandani,** B. Mandal, **S. Dharaskar**, Measurements and modeling of vapor liquid equilibrium of CO2 in amine activated imidazolium ionic liquid solvents, Fluid Phase Equilibria, 521-530, October 2020
- K Thakkar, S S Kachhwaha, **Pravin Kodgire**, Seshasai Srinivasan 'Combustion investigation of ternary blend mixture of bio-diesel/n-butanol/diesel: CI engine performance and emission control', Renewable and Sustainable Energy Reviews, pp. 18, 110468, Oct 2020
- **D.V. Suriapparao,** A. Yerrayya, G. Nagababu, R.K. Guduru, T.H. Kumar, Recovery of renewable aromatic and aliphatic hydrocarbon resources from microwave pyrolysis/co-pyrolysis of agro-residues and plastics wastes, Bioresource Technology, 318, 2020, https://doi.org/10.1016/j.biortech.2020.124277
- **D.V. Suriapparao**, G. Nagababu, A. Yerrayya, V. Sridevi, Optimization of microwave power and graphite susceptor quantity for waste polypropylene microwave pyrolysis, Process Safety and Environmental protection, 149, 234-243, 2020, https://doi.org/10.1016/j.psep.2020.10.055
- Pranav Parekh, Shireen Patel, Nivedita Patel, **Manan Shah**. Systematic review and meta-analysis of augmented reality in medicine, retail, and games. Visual Computing for Industry, Biomedicine, and Art, Springer, Scopus, 3 (1), 1-20. September, 2020. https://vciba.springeropen.com/articles/10.1186/s42492-020-00057-7.
- Kriti Yadav, **Manan Shah**, Anirbid Sircar. Application of magnetotelluric (MT) study for the identification of shallow and deep aquifers in Dholera geothermal region. Groundwater for Sustainable Development, Elsevier, Scopus. 20, 100472. October, 2020. https://www.sciencedirect.com/science/article/abs/pii/S2352801X19302413,.
- Binny Naik, Aashir Mehta, **Manan Shah** Denouements of machine learning and multimodal diagnostic classification of Alzheimer's disease. Visual Computing for Industry, Biomedicine, and Art, Springer, Scopus, 3(1), 1-18. November, 2020. https://vciba.springeropen.com/articles/10.1186/s42492-020-00062-w
- Aaryan Gupta, Vinya Dengre, Hamza Abubakar Kheruwala, **Manan Shah**, Comprehensive review of text-mining applications in finance. Financial Innovation, Springer, Scopus, 6, Article number: 39. November, 2020. https://jfin-swufe.springeropen.com/articles/10.1186/s40854-020-00205-1
- **Subhankar Roy,** M. R. Thaokar, Numerical study of coalescence and non-coalescence of two conducting drops in a non-conducting medium under electric field, Journal of Electrostatics, 108, 103515, 2020, doi.org/10.1016/j.elstat.2020.103515
- P. Pillai (PhD Scholar), **S. Dharaskar**, S. Pandian "Overview of fluoride removal from water using separation techniques: A Review" Environmental Technology & Innovation, Dec 2020 (Q1 Journal, I.F. 3.5, Elsevier)
- Kanubhai K. Parmar, Kunjal K. Parmar, Garimella Padmavathi, **Sukanta K. Dash**, Energy reduction and improved product recovery with enhanced safety of industrial scale propane-propylene separation process, Int J Energy Res. Vol- 44, Issue 15, PP: 12630-12638, Dec-2020, https://onlinelibrary.wiley.com/doi/10.1002/er.5511
- **Anirban Dey, B.** Mandal, **Sukanta K. Dash**, Analysis of equilibrium CO2 solubility in aqueous APDA and its potential blends with AMP/MDEA for postcombustion CO2 capture. Int J Energy Res. Vol- 44, Issue 15, PP: 12395-12415, Dec-2020; https://doi.org/10.1002/er.5404
- Yashvi Sheth, **S. Dharaskar,** "An Environment Friendly Approach for Heavy Metal Removal from Industrial Wastewater Using Chitosan Based Biosorbent: A Review, Elsevier - Sustainable Energy Technologies and Assessments, 43, 1-29, 2020

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PUBLICATIONS

Journal Publications (continues)

- K. Desai (PhD Scholar), **S. Dharaskar,** Triphenyl Methyl Phosphonium Tosylate As an Efficient Phase Transfer Catalyst for Ultrasound Assisted Oxidative Desulfurization of Liquid Fuel, Environmental Science Pollution Research (Accepted in Dec 2020) (Q2 Journal, I.F. 3.0, Springer Publisher)
- **Ashish P. Unnarkat**, Shireen Singh, Shubham Kalan, Ethylbenzene oxidation using cobalt oxide supported over SBA-15 and KIT-6 Materials Today Proceedings https://doi.org/10.1016/j.matpr.2020.09.08

Book Chapter

- **R. Saxena,** S.F. Ali, D. Rakshit, "PCM incorporated bricks: A passive alternative for thermal regulation and energy conservation in buildings for Indian conditions", in: Eco-Efficient Mater. Reducing Cool. Needs Build. Constr., Elsevier, 2021: pp. 303–328. doi:10.1016/b978-0-12-820791-8.00014-6 (Online: October 2020)
- Rashi Sultania, P. Pillai, **S. Dharaskar**, J. Rupareliya "Synthesis of silver nanoparticles by using soluble starch and its application in detection of Hg2+ ions from waste water" Technologies for sustainable development (Springer Publisher).
- R. Shivrajsekhar, **S. Dharaskar,** "Applications of Smart polymers in nanomedicine', Smart Polymer Nanocomposites" Biomedical and Environmental Applications, Elsevier, 978-0-12-820435-1, pp. 215-229, Nov 2020
- Parwathi Pillai, **S. Dharaskar** "Removal of arsenic using nanoparticles from ground water: a review" Handbook of Solid Waste Management (Springer)
- Parwathi Pillai, **S. Dharaskar** "Review: Role of carbon-based nanomaterials with its application for wastewater treatment"
- "Potential Risk, and Safety Concerns of Nanomaterials" has been accepted for publication in "Handbook on Nanomaterials for Wastewater Treatment: Fundamentals, Current Status and Scale up Issues" - Elsevier Publisher https://www.elsevier.com/books/handbook-of-nanomaterials-for-wastewater-treatment/bhanvase/978-0-12-821496-1

Conference Papers

- K Thakkar, S S Kachhwaha, **Pravin Kodgire**, P Shah, 'Optimization of Biodiesel Production using Supercritical Solvent by Taguchi's Technique and CI Engine Testing', DTU, RAME 2020, Delhi, pp. 12, Sep 2020
- **Abhishek K. Gupta.** Molecular Dynamics Simulations Studies of Structure and Dynamics of Polyelectrolytes in Solutions, ICM 2020, Organized by Mahatma Gandhi University, Kottayam & Gdansk University of Technology, Poland, 13-15th November 2020.
- **Abhishek K. Gupta**, Salt Ions Induced Transport Properties Of Poly(Methacrylic Acid) PMA In Aqueous Solutions Studied By Molecular Dynamics Simulations. ICMPC 2020, Organized by IIT Indore, 15-17 December 2020.

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PUBLICATIONS

Contents lists available at ScienceDirect

Environmental Technology & Innovation

journal homepage: www.elsevier.com/locate/eti

Overview of fluoride removal from water using separation techniques

Parwathi Pillai [a], Swapnil Dharaskar [a,*], Sivakumar Pandian [b], Hitesh Panchal [c]

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Keywords:
Fluoride removal
Methods
Review

ABSTRACT

Fluoride contamination due to natural and anthropogenic activities has become the biggest threat to human health worldwide. Geological and anthropogenic factors are responsible for contaminating groundwater with fluoride. Excess amounts of fluoride in potable water may cause irreversible demineralization of bone and tooth tissues, a condition called fluorosis, and long-term damage to the brain, liver, thyroid, and kidney. For a long time there has been a need for fluoride removal from potable water to make it safe for human use. The present paper reviews the different methods used for defluoridation, for example, coagulation–precipitation, ion exchange, membrane separation, and adsorption. Among the methods, membrane and ion exchange are not regularly used in India due to their cost and high maintenance. On the other hand, coagulation–precipitation and adsorption are mostly used in India. Nalgonda method is used in developing nations like Kenya, Senegal, Tanzania, and India for fluoride removal. Comparatively, adsorption is broadly used for defluoridation because of its low cost and high efficiency in removal. This paper also discusses the merits and demerits of the methods. It is evident from literature study that different methods show unique potential for defluoridation. The most promising adsorbents tested so far from each category of adsorbents are also highlighted. In any circumstance, there is an urgent requirement to find the practical utility of such developed methods on a business scale and to initiate a change in contamination control.

Contents lists available at ScienceDirect

Sustainable Energy Technologies and Assessments

journal homepage: www.elsevier.com/locate/seta

An environment friendly approach for heavy metal removal from industrial wastewater using chitosan based biosorbent: A review

Yashvi Sheth [a], Swapnil Dharaskar [a,*], Mohammad Khalid [b], Shriram Sonawane [c]

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[b] Graphene & Advanced 2D Materials Research Group, School of Science and Technology, Sunway University, Selangor, Malaysia
[c] Department of Chemical Engineering, Visvesvaraya National Institute of Technology (VNIT), Nagpur, Maharashtra, India

ARTICLE INFO

Keywords:
Wastewater treatment
Adsorption
Chitosan
Heavy metal removal
Magnetic chitosan
Bio-sorbent

ABSTRACT

Industrial wastewater has imposed increasing threats due to the large concentrations of various toxic and hazardous contaminants. Amongst various processes to treat wastewater, adsorption is widely being adopted due to its simplicity, good treatment efficiency, availability of a wide range of adsorbents, cost efficiency, etc. Chitosan, the second most abundant biopolymer is well-known due to its unique properties and versatile nature like abundance, biodegradable, low-cost, presence of adsorptive functional groups, and good reactivity. Due to these properties, it is found highly potential for the application as an adsorbent to remove heavy metal ions. The present review study focuses and analyses the suitability of chitosan as an adsorbent for heavy metal removal, modifications of chitosan like cross-linking, grafting, & magnetic chitosan, the adsorption performances of chitosan and modified chitosan towards heavy metal ions along with the factors affecting it, kinetic model fitting, thermodynamic model fitting, and the isotherm fitting. The mechanism of adsorption is discussed in detail. Usage of a few novel modifiers has been highlighted. At last, the gaps in the research and future perspectives are discussed. Throughout the review, it was verified that chitosan upon chemical modifications with different physical morphologies showed good removal efficiencies and adsorption capacities for heavy metal for the synthetic wastewater due to the amino and hydroxyl functional groups which majorly took part in adsorption. Good removal efficiencies of greater than 80% were mostly obtained, with a few having extraordinary 95–96% uptake. Finally, gaps were observed in dynamic or column-based experiments and the complex industrial wastewater treatment which requires more focus to build an industrial perspective. Thus, the commercialization of modified chitosan adsorbent is quite far.

Contents lists available at ScienceDirect

Groundwater for Sustainable Development

journal homepage: http://www.elsevier.com/locate/gsd

Research paper

Application of magnetotelluric (MT) study for the identification of shallow and deep aquifers in Dholera geothermal region

Kriti Yadav [a], Manan Shah [b,*], Anirbid Sircar [c]

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[b] Department of Chemical Engineering, Pandit Deendayal Petroleum University, Raisan, Gandhinagar, 382007, India
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ARTICLE INFO

Keywords:
Geothermal
Dholera
Magnetotelluric
Resistivity
Anomaly

ABSTRACT

In India geothermal energy is still in nascent stage and there are several geothermal regions which are not explored. By exploring these fields India still be able to understand the potential of geothermal energy and its application for power generation and development in other industrial and agricultural sectors. As world is switching from conventional to renewable energy sector, geothermal energy will be one of the most promising alternative for fossil fuels. The Cambay region of West Coast continental margin has enormous geothermal potentials. In this paper one such geothermal zone of Cambay Basin namely Dholera has been explored to understand the potential of the region. An extensive MT survey has been carried out in this region along 6 profile lines and 96 station points. The main aim of the paper is to identify the shallow and deep aquifer zones in the study area for exploitation of geothermal energy which can be used for various societal benefits. In order to explore aquifer potentials MT data was acquired using SciencesZ050.com Phoenix Geophysics Ltd equipment. This is the first high-resolution 3D seismic survey was carried out in the study area in order to identify the geothermal sweet spots. Skew, Tipper and Polar diagrams were prepared to understand the dimension of the identified conductive bodies. The interpretation of MT data in the form of geoelectrical maps indicate presence of high conductive zones at 5 km depth extending up to 7 km. This high conductive bodies indicates the presence of aquifers which can be the zone of interest. Drilling will target these zones to explore geothermal water.

REVIEW — Open Access

Denouements of machine learning and multimodal diagnostic classification of Alzheimer's disease

Binny Naik [1], Ashir Mehta [1] and Manan Shah [2*]

Abstract

Alzheimer's disease (AD) is the most common type of dementia. The exact cause and treatment of the disease are still unknown. Different neuroimaging modalities, such as magnetic resonance imaging (MRI), positron emission tomography, and single-photon emission computed tomography, have played a significant role in the study of AD. However, the effective diagnosis of AD, as well as mild cognitive impairment (MCI), has recently drawn large attention. Various technological advancements, such as robots, global positioning system technology, sensors, and machine learning (ML) algorithms, have helped improve the diagnostic process of AD. This study aimed to determine the influence of implementing different ML classifiers in MR and analyze the use of support vector machines with various multimodal scans for classifying patients with AD/MCI and healthy controls. Conclusions have been drawn in terms of employing different classifier techniques and presenting the optimal multimodal paradigm for the classification of AD.

Keywords: Machine learning, Support vector machine, Alzheimer

REVIEW — Open Access

Comprehensive review of text-mining applications in finance

Aaryan Gupta [1], Viriya Dengre [1], Hamza Abubakar Kheruwala [1] and Manan Shah [2*]

*Correspondence:
manan.shah@spt.pdpu.ac.in
[1] Department of Chemical Engineering, School of Technology, Pandit Deendayal Petroleum University, Gandhinagar, Gujarat 382007, India
Full list of author information is available at the end of the article

Abstract

Text-mining technologies have substantially affected financial industries. As the data in every sector of finance have grown immensely, text mining has emerged as an important field of research in the domain of finance. Therefore, reviewing the recent literature on text-mining applications in finance can be useful for identifying areas for further research. This paper focuses on the text-mining literature related to financial forecasting, banking, and corporate finance. It also analyzes the existing literature on text mining in financial applications and provides a summary of some recent studies. Finally, the paper briefly discusses various text-mining methods being applied in the financial domain, the challenges faced in these applications, and the future scope of text mining in finance.

Keywords: Text mining, Machine learning, Financial forecasting, Sentiment analysis, Text classification, Corporate finance

Systematic review and meta-analysis of augmented reality in medicine, retail, and games

Pranav Parekh, Shireen Patel, Nivedita Patel & Manan Shah

Visual Computing for Industry, Biomedicine, and Art

e-ISSN 2524-4442
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Number 1

Vis. Comput. Ind. Biomed. Art (2020)
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DOI 10.1186/s42492-020-00057-7

ScienceDirect

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Eco-efficient Materials for Reducing Cooling Needs in Buildings and Construction
Design, Properties and Applications

Woodhead Publishing Series in Civil and Structural Engineering
2021, Pages 303-328

14 - PCM incorporated bricks: A passive alternative for thermal regulation and energy conservation in buildings for Indian conditions

Rajat Saxena [a], Sana Fatima Ali [b], Dibakar Rakshit [b]

FACULTY BOARD

PROJECT PROPOSALS (SUBMITTED)

- **Dr. Dadi Surriaparao** submitted project entitled "To predict the effect of using lignocellulosic bio-oil as jet fuel blend in a small-gas turbine engine" costing of Rs. 47,00,000 sponsored by DST.
- **Dr. Rajat Saxena** submitted a project as Co-PI, entitled "Smart Steam Disinfection System to Fight COVID 19 in Public Places" in Gujarat Council on Science and Technology (GUJCOST), October 2020 (Submitted for Second Round Evaluation).
- **Dr. S. Dharaskar (PI)** & Prof. P. Parikh (Co-PI, SVNIT, Surat) submitted research proposal worth Rs. 56 Lakh under call of Office of the Principal Scientific Adviser, Govt. of India.
- **Dr. Ashish Unnarka(PI)** and Dr. Jay Vora (Co-PI), Dr. Krishna Kanta Ghara, Seaveda Biotech Private Limited Dr. Anshu Kumar, Seaveda Biotech Private Limited Aditya Suraj Shukla, Saltech Design Labs Private Limited submitted the project named Project Title Advance waste conversion technology to manufacture polymer biocomposite material from substantially unsorted solid waste (USW) costing of Rs.419.67 Lakhs on 30th November 2020.

PATENTS

Patent Number	Title of Invention	Name of Inventors
201821027227	Process for improving the yield of light olefins produced from Heavy Naptha	Kanubhai Kalidas Parmar, Padmavathi Garimella, Sumeet Kumar Sharma, Raksh Vir Jasra, **Sukanta K. Dash**
202021004406	Process for preparation of Biodiesel	A Sharma, **P Kodgire**, S.S. Kachhwaha
202021006776	An improved composition and process for preparation of biodiesel	K Thakkar, **P Kodgire**, S S Kachhwaha
202021018720	An improved process for preparation of Biodiesel	K Thakkar, **P Kodgire**, S S Kachhwaha
Awaiting for the filing Number	A Novel Methanol based oil extraction technique intensified by hybrid irradiation	K Thakkar, **P Kodgire**, S S Kachhwaha

CONSULTANCY WORK

- **Dr. Sukanta Dash** completed consultancy work with M/s: Carbon Capture Technologies Pvt. Ltd, Mumbai, on Development and analysis of CO2 capture system using chemical solvents in 03 months (October—December 2020) costing Rs. 1,62,249/-

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WORKSHOP/ SEMINAR/ WEBINARS

WORKSHOPS / FDP'S / TRAININGS

- **Ravi Tejasvi** attended a five-day online short-term course on Process Simulators for Chemical Engineering Applications from September 25-29, 2020 organized by MNIT Jaipur.
- **Dr. S. Dharaskar** attended the 3 days Faculty Development Programme on "Outcome based Education" organized by Inpods, India dated 4th to 6th Nov 2020.
- **Dr. S. Dharaskar** attended the webinar on "Response of the DBTs autonoums institute to COVID -19 (Part-IV)" organized by DBT, India dated 19th Nov 2020
- **Dr. S. Dharaskar** attended 2nd International Symposium on Analytical and applied pyrolysis Organized by Pyro-Asia 2020 during 11th to 13th Dec 2020.
- **Dr. S. Dharaskar** attended one week AICTE training and Learning (ATAL) online FDP on "Green Technology & Sustainability Engineering" during 7th to 11th Dec 2020 organized by Rajasthan Technical University, Kota, Rajasthan.
- **Dr. S. Dharaskar** attended one week AICTE training and Learning (ATAL) online FDP on "Green Technology & Sustainability Engineering" during 7th to 11th Dec 2020 organized by Rajasthan Technical University, Kota, Rajasthan.
- **Dr. S. Dharaskar** attended one week AICTE training and Learning (ATAL) online FDP on "Energy Conservation and Renewable Energy for Sustainable Development" during 15th to 19th Dec 2020 organized by LD College of Engineering, Ahmadabad, Gujarat, India.
- **Dr. S. Dharaskar** attended India International Science Festival (IISF-2020) Organized by Ministry of Science & Technology, Ministry of Earth Science and Ministry of Health and Family Welfare, Govt. of India in Collaboration with Vijana Bharati by CSIR, India dated on 22nd to 25th Dec 2020.
- **Dr. S. Dharaskar**, attended one week STTP on "Building Energy Efficiency: An Approach towards Sustainable Development" organized by Civil Engineering Department, Indus University, Ahmadabad during 28th Dec 2020 to 1st Jan 2021.
- **Dr. Ashish Unnarkat** Attended FDP on Outcomes based Education conducted by Inpods on 4-6th November 2020

RECOGNITIONS

- **Dr. Manan Shah** received the **Best Paper Award** for his publication "A Comprehensive Review on Automation in Agriculture using Artificial Intelligence" in Artifical intelligence in Agriculture.
- **Dr. Dadi V Surriapparao** has been awarded as **Best Researcher Award** for the contribution of and honorable achievement in innovative research by International Research awards on New Science Inventions on 13th November 2020.
- **Dr. Rajat Saxena** has been awarded with **Certificate of Appreciation** for his contribution as **Session Chair** in an International conference on "Futuristic and Sustainable aspects in engineering and technology" organized by Department of Mechanical & Civil Engineering, GLA University Mathura held on 18th -19th December 2020.
- **Dr. Abhishek K. Gupta** was invited as **Session Chair** at ICM - 2020, Organized by Mahatma Gandhi University, Kottayam & Gdansk University of Technology, Poland, 13-15th November 2020
- **Dr. Swapnil Dharaskar** received **Certificate of Appreciation** for judging the event named Chemfluence during SPE-Fest 2020 from 5th November 2020 to 08th November 2020.

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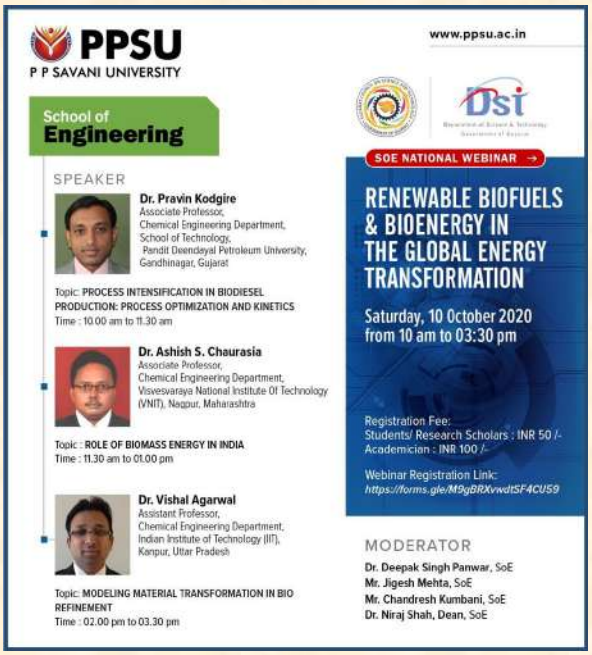
WORKSHOP/ SEMINAR/ WEBINARS

WEBINARS ATTENDED

- **Dr. Swapnil Dharaskar** attended an online webinar on “Response of DBT’s Autonomous institutes to Covid-19 (Part IV) on 19th November 2020.
- **Dr.. Ravi Tejasvi attended** Novel Electrochemical Energy Devices for Storage (NEEDS-2020), International Webinar series from August 17-19, 2020 orgnaised by ABINNOVUS and IIT Madras.
- Ravi Tejasvi attended National Virtual Conference on Recent Advances in Analytical Techniques (RAAT-2020) from August 16-17, 2020 organized by USERC-DST, Dehradun.
- **Dr. Ashish Unnarkat** Attended Webinar on Technology Transfer Organized by IIC PDPU on 28th October 2020
- **Dr. Ashish Unnarkat** attended 1 Day Webinar on Emerging Trends in Heterogeneous Catalysis and New Challenges - Organized by Catalysis Society of India - Baroda Chapter in association with MS University of Baroda & Navrachana University

EXPERT TALKS DELIVERED

- **Dr. Manan Shah** delivered an expert talk on “Geothermal Energy Prospective in Gujarat” on 9th September 2020 through online mode organized by Vishwakarma Engineering College, Ahmedabad.
- **Dr. Pravin Kodgire** delivered an expert talk on “Renewable Biofuel and bioenergy in the global energy transformation” on 10th October 2020 during one day National webinar at P P Savani Univesity, Surat sponsored by DST and Govt of Gujarat.
- **Dr. Pravin Kodgire** delivered an expert talk in a Short Term Training Program on “Advances in Waste Management Systems” organized at A. D. Patel Institute of Technology, November 02 - 06, 2020, sponsored by DST and Govt of Gujarat.



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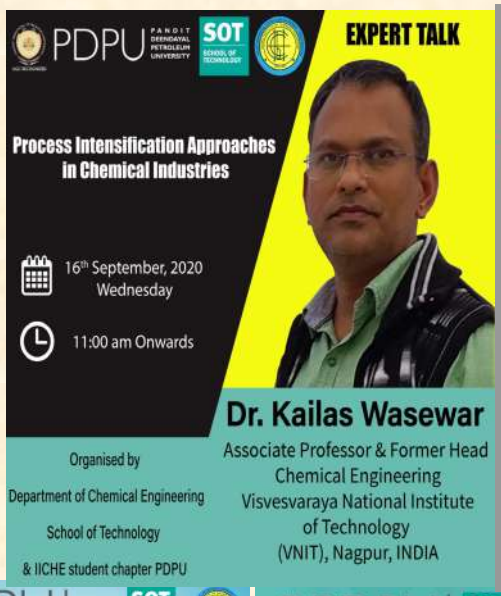
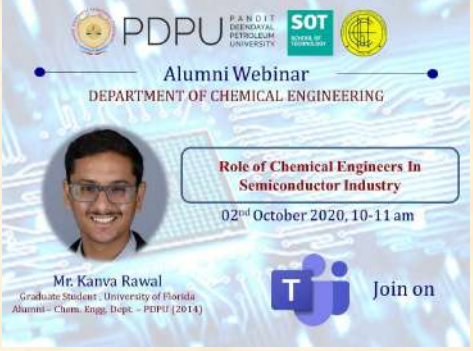
WEBINARS/ EXPERT TALKS ORGANIZED

WEBINARS/ EXPERT TALKS ORGANIZED





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WEBINARS ORGANIZED & RECOGNI-

WEBINARS ORGANIZED

Date	Title of Webinar	Speakers Name	Moderator	Number of Participants
06th September 2020	Environment Impact assessment for chemical industry	Dr. Vidyadhar Gedam, NIIE, Mumbai	Dr. Swapnil Dharaskar	50
16th September 2020	Process intensification approaches in chemical industries	Dr. Kailas Wasevar, Former Head, VNIT, Nagpur	Dr. Swapnil Dharaskar	80
02nd October 2020	Role of Chemical Engineering in Semiconductor Industry	Mr. Kanva Raval	Dr. Ashish Unnarkat	80
04th October 2020	An Insight of writing a high quality paper and proposal	Dr. R Rajesh Nithyanandam, Professor, MSEC, Tamil Naidu	Dr. Swapnil Dharaskar	60
01st November 2020	Overview of procurement & contracting in supply chain management	Mr. Kavit Shah, Buyer-PETCHEM, RIL	Dr. Ashish Unnarkat	45
04th November 2020	Energy Conservation and its contribution towards Sustainable Development	Prof. Dibakar Rakshit, Associate Professor, IIT Delhi	Dr. Rajat Saxena	120
04th November 2020	Process Integration and Heat Exchanger Network: Part-1	Dr. Kanubhai K. Parmar, Head, Energy Management, Reliance Industries ltd	Dr. Sukanta Dash	100
12th December 2020	Environmentally Benign solvents for sustainable developments in chemical and technological applications	Prof. Ramesh Gardas, Professor, IIT Madras	Dr. Swapnil Dharaskar	120

EQUIPMENT INSTALLATION

Thermo Gravimetric Analysis (TG-DTA) from Hitachi was Installed in Mass Transfer Lab - **Dr. Ashish Unnarkat** coordinated the procurement and installation of the same. Equipment adds to the materials characterization facility at PDPU.

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AWARDS AND OTHER ACHIEVE-

HEARTIEST CONGRATULATIONS

Dr. Fiyanshu Kaka successfully defended his Ph.D. thesis titled “Numerical and experimental investigation of process-structure-property relationship in organic photovoltaics.” This work involved the formulation of a novel in silico framework comprising physics-based and data-science model for establishing process-structure-property relationship in polymer solar cells and was carried out at IISc Bangalore under the guidance of Prof. Abhik N Choudhury and Prof. Praveen C Ramamurthy. The doctorate was awarded to him on Dec 29, 2020.

Dr. Ravi Tejasvi successfully defended his PhD thesis titled "Fabrication of Titania and Carbon Nitride based Thin Film Electrodes for Photoelectrochemical Water Splitting", under guidance of Prof. Suddhasatwa Basu of the department of Chemical Engineering, Indian Institute of Technology Delhi. The degree has been awarded to Dr. Tejasvi on November 7, 2020 by IIT Delhi.

Dr. Md Aurangzeb successfully defended his PhD thesis titled “Dividing wall column for azeotropic systems: Energy and cost saving” on November 3, 2020. This PhD work is done under the guidance of Prof. Amiya K Jana. The PhD degree is awarded by the Indian Institute of Technology Kharagpur, India

Dr. Subhankar Roy completed his doctoral studies titled “Numerical Investigations in Electrocoalescence Behaviour of Aqueous Droplets Suspended in Dielectric Oil” from Department of Chemical Engineering, IIT Bombay, with Prof. Rochish M. Thaokar as his advisor. His research primarily focused on understanding the complex physics behind multiple droplets interacting under electric field, which is the norm in industrial desalters

WELCOME TO NEW FACULTY

Dr. Fiyanshu Kaka

Dr. Kaka is presently deputed as an Assistant Professor in the Department of Chemical Engineering. He holds a B.Tech. Degree (first class with distinction) in Polymer Science and Chemical Technology from Delhi Technological University (Formerly Delhi College of Engineering). Further, he pursued an integrated Ph.D. from the Indian Institute of Science (IISc), Bangalore. His Ph.D. dissertation proposed a novel in silico framework comprising physics-based and data-science model for establishing the process-structure-property relationship in organic photovoltaics for which his publication “Investigation of process-structure-property relationship in ternary organic photovoltaics” was featured on the cover of the Journal of Applied Physics as well as on the home page of AIP. Dr. Kaka was granted financial support by JNCASR from the DST-Synchrotron-Neutron project to conduct in-situ experiments at the SOLEIL synchrotron radiation facility, France, in 2020. He has received travel grants from Tata-trusts and Ras Al Khaimah Centre for Advanced Materials for attending international conferences.

STUDENT BOARD

RESEARCH AND OTHER ACTIVITIES

CONFERENCES ATTENDED

- **Jayantkumar Jalandar Patil (19MCH005),** Dr. Dadi V Surriapparao, Effect of particle size and concentration of fly ash on the properties of polymer composite, virtual mode, October 9-10 2020, Indian institute of chemical engineers.
- **Sooraj SV (19MCH014),** Dr. Dadi V Surriapparao, Study and Analysis of Physical and Thermal Properties of biopolymeric composites and effects of the composition change on the properties of the biopolymeric composites, SCHEMCON 2020, organized by IIChE headquarters through virtual mode, held on October 9-10, 2020.
- **Prachi Shah (17BCH044),**Dr. Bharti Saini, Recent developments in functionalized polymeric membrane, in the SCHEMCON 2020, organized by IIChE Kolkata, through virtual mode, held on October 9-10, 2020.
- **Abhishek A. Kagalkar (19MCH001),** Dr. Rajat Saxena, "A Review on Stability of Nano-enhanced Phase Change Materials" in the SCHEMCON 2020, organized by IIChE Kolkata, through virtual mode, held on October 9-10, 2020.
- **Hamzah A. Menem (19MCH019),** Dr. Rajat Saxena, "Review on Nano Enhanced Phase Change Materials for Storage Applications" in the SCHEMCON 2020, organized by IIChE Kolkata, through virtual mode, held on October 9-10, 2020.
- **Siddhant Gohil (19MCH012),** Abhishek K. Gupta. Effect of inorganic salt on the structure and dynamics of stereoregular isomers of poly(methacrylic acid) in dilute aqueous solutions - A molecular dynamics simulation study, SCHEMCON 2020, IIChE Kolkata, October 10-11, 2020.
- ***Mr. Suvik Oza (M.Tech Student)*** has participated in Basic Skill development training on Crude Assay and Testing of Petroleum Fractions' organized by CSIR-IIP Dehradun during October 5th to 9th October 2020.
- **Mr. Tushar Patil (JRF),** S. Dharaskar, M. Sinha, S. Sasikumar, presented and received Best Paper Award titled on "Energy Efficient CO2 Separation Process" in PRAKALP-2020, organized by MIT, Alandi, Pune during 11th to 12th Sep 2020.
- **Mrs. Komal Desai (PhD Scholar),** S. Dharaskar, attended and received the Best Paper Award for paper titled on "Trihexyl Tetradecyl Phosphonium Chloride as an Efficient Catalyst for Ultrasound-Assisted Oxidative Desulfurization of Fuel" in CHEMCON- 2020 organized by Indian Chemical Engineering Congress dated on 27th to 29th Dec 2020dated on 27th to 29th Dec 2020.
- **Mrs. Parwathi Pillai (PhD Scholar),** S. Dharaskar, presented the paper Exploring Recent Trends in Chemical Engineering "organized by Indian Chemical Engineering Congress (CHEMCON 2020), dated on 27th to 29th Dec 2020.
- **Ms. Yashvi Sheth** (M.Tech Student), S. Dharaskar, participated & presented paper titled in Young Scientists Conference (YSC), International Science Festival (IISF-2020) Organized by Ministry of Science & Technology, Ministry of Earth Science and Ministry of Health and Family Welfare, Govt. of India in Collaboration with Vijana Bharati by CSIR, India dated on 22nd to 25th Dec 2020.
- **Mr. Megh Sanghani (M.Tech Student),** S. Dharaskar, participated & presented paper titled "Energy-Efficient Carbon Dioxide Separation Using Ionic Liquids" in Young Scientists Conference (YSC), International Science Festival (IISF-2020) Organized by Ministry of Science & Technology, Ministry of Earth Science and Ministry of Health and Family Welfare, Govt. of India in Collaboration with Vijana Bharati by CSIR, India dated on 22nd to 25th Dec 2020.
- **Mr. Megh Sanghani (M.Tech Student),** S. Dharaskar participated & presented research paper titled "Technological Applications Of Superhydrophobic Coatings: Needs And Challenges" in CHEMCON-2020 organized by Indian Institute Of Chemical Engineers and Jadavpur University Campus, Kolkata during 27th to 29th Dec, 2020.

STUDENT BOARD

RESEARCH AND OTHER ACTIVITIES

- **Parsana N.,** Unnarkat A., Removal and Recovery of Phosphorus from Waste Water - Technology Perspective, SCHEMCON 2020, Indian Institute of Chemical Engineers, Oct 2020 (Online)
- **Mehta M.,** Unnarkat A., Dimethyl Ether from Syngas – Standpoint on Catalyst and Reactor Configurations, SCHEMCON-2020, Indian Institute of Chemical Engineers, Oct 2020 (Online)
- **Parsana N.**, Unnarkat A., Removal and Recovery of Phosphorus from Waste Water - Technology Perspective, PRA-KALP 2020 – 16th National Chemical Engineering Students Conference, MIT Academy of Engineering, Sept 2020 (Online)
- **Mehta M.,** Unnarkat A., Dimethyl Ether from Syngas – Standpoint on Catalyst and Reactor Configurations, PRAKALP 2020 – 16th National Chemical Engineering Students Conference, MIT Academy of Engineering, Sept 2020 (Online)

STUDENT ACHIEVEMENTS /AWARDS

- **Mr. Siddh Bhatt** (3rd Year UG) has participated in Industrial Design Problem and secured 3rd position in garVIT-20 an International Techno-Management Carnival organized by VIT, Vellore during 1st to 4th Oct 2020.
- **Ms. Anjali Thaker** (3rd Year UG), represented and worked as Campus Ambassador for A National Level Chemical Engineering Quiz (CHEM-O-PHILIA) organized by IIT, Mumbai dated on 24th October 2020.
- **Mr. Shikar Srivastava (3rd Year UG)** Participated and secured 1st Position in A National Level Chemical Engineering Quiz (CHEM-O-PHILIA) organized by IIT, Mumbai dated on 24th October 2020.
- **Mr. Harsh Pancholi (3rd Year UG)** Participated and secured 2nd Position in A National Level Chemical Engineering Quiz (CHEM-O-PHILIA) organized by IIT, Mumbai dated on 24th October 2020.
- **Mr. Jimit Patel (3rd Year UG)** Participated and secured 3rd Position in A National Level Chemical Engineering Quiz (CHEM-O-PHILIA) organized by IIT, Mumbai dated on 24th October 2020.
- **Avani Makhesana & Prachi Desai** got 1st Rank in Chemfluence quiz event during SPE Fest 2020 organized by School of petroleum technology , PDPU from 5th November to 8th November 2020.

PLACEMENTS

Shah Arya Prakash
System Engineer
INFOSYS

Raj Parikh
System Engineer
INFOSYS

Asti Zeel Rakeshbhai
Graduate engineer Trainee
Larsen & Toubro Limited

Tanmay Prakash Sanghvi
Graduate engineer Trainee
Larsen & Toubro Limited

Makhesana Avani Pravinkumar
Analyst - Risk - Internal Audit
Ernst & Young

Vinod Suthar
Analyst - Risk - Internal Audit
Ernst & Young

STUDENT BOARD

STUDENT ORIENTATIONS

U.G. Orientation Program (Departmental)

The UG Orientation session for the 1st year Chemical Engineering students was held on **October 30, 2020 (2-6 pm)**. At the beginning, Dr. Rajat Saxena and Dr. Manan Shah, moderator of the event, extended warm welcome to the newly admitted students and faculty members in the orientation session. The event was further continued by the Keynote Address by **Dr. Anurag Gupta -Senior Mentor PDPU** on the topic "***PDPU Vision - Skills to Acquire to be Future Ready***". Dr. Gupta in his talk emphasizes various skill sets to be acquired by the newly budding engineers in the direction of sustainable development as well as societal upliftment. The event was further carried over by the departmental introduction including journey of Dept., faculty introduction and the departmental accolades by **HOD - Dr. Swapnil Dharaskar**. The session also involved an Industrial Expert session by **Dr. Maroti Kadam, Deepak Nitrite,** Baroda on the topic "***Chemical Engineering Perspective-Shift from campus to company***".
Other departmental modalities such as Course Curriculum, Laboratory Facilities, Training & Placements, Projects, Alumni Affairs as well as Introduction to Departmental IIChE student chapter were also briefed up by the respective Faculty Co-ordinators. The session also witnessed a special student centric activity, "***Kaun Banega Chemical Engineer***", an introductory Quiz competition. The activity was co-ordinated entirely by the student members of the IIChE Student chapter (Kartik, Jimit and Vandan) and it was quite popular among all the student participants. At the end, Dr. Anirban Dey concluded the session by delivering the Vote of thanks to all attendees.

P.G. Orientation Program (Departmental)

The M.Tech. Orientation program for newly joined PG students in academic year 2020-2021 was organized on **November 5, 2020**. The session was started by a welcome address by Dr. Abhishek K. Gupta to all the newly joined M.Tech students in both programs i.e., Chemical Engineering & Energy & Environmental Management. All the sessions were moderated by Dr. Abhishek K. Gupta & Dr. Manan Shah. The first session was addressed by **Dr. Anurag Gupta -Senior Mentor PDPU,** where he enlightened the students about the vision of PDPU, highlighted the importance of intellectual property rights and careers path for the students. The second session was addressed by the head of the department (Dr. Swapnil Dharaskar) where the various details about the department, achievements, and introduction of esteemed faculty members were given. Dr. Pravin Kodgire and Dr. S.K Dash addressed the next session. Both of them briefed the students about the availability of center of excellence in the biofuel research & CO2 research group at PDPU. Dr. Manish Sinha shared the M.Tech. course curriculum structure to all the new PG students in both programs. Dr. Rajat Saxena gave the working demonstration of MS teams platform functionality beneficial for student learning and classes. Dr. Ashish Unnarkat highlighted the achievements of B.Tech. and M.Tech. Alumni. The former and distinguished alumni shared their experiences during this session. The program ultimately concluded with a vote of thanks given by Dr. Anirban Dey.

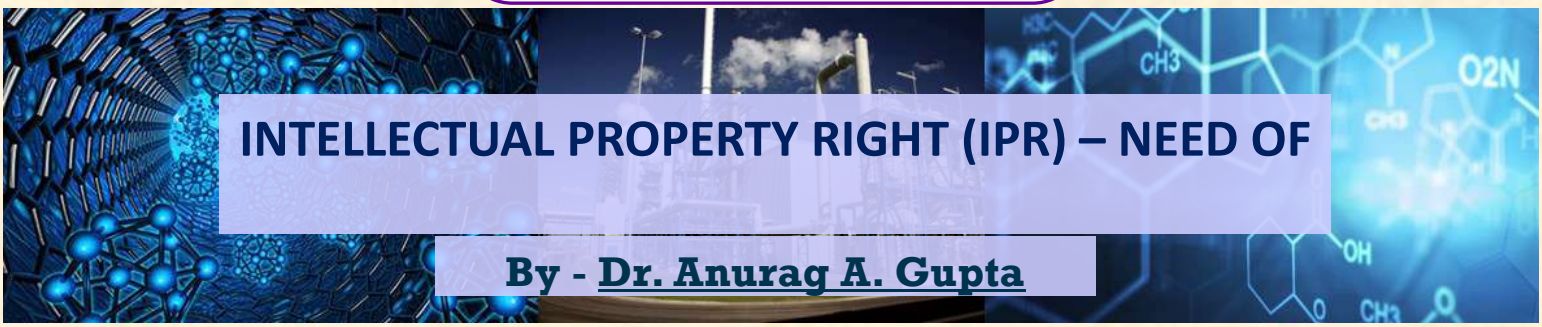
Welcome to Ph.D. Students

Mr. Tushar Patil (Dr. Swapnil Dharaskar, Research Guide)

Ms. Sapana Deotale (Dr. Surendra Sasikumar, Research Guide)

Mrs. Parveen Gandharva (Dr. Ashish Unnarkat, Research Guide)

FEATURE ARTICLE



INTELLECTUAL PROPERTY RIGHT (IPR) – NEED OF

By - Dr. Anurag A. Gupta

Intellectual Property (IP) is a general term used for a set of intangible assets owned by any individual person or an entity. An IP asset aims to offer the same protective rights as any other physical property, because of its ability to provide individuals/organizations with the same competitive advantages. It has now become even more important in a web-based environment, as doing replication of any unique design, logo, or feature is comparatively easier than ever before.

Intellectual Property rights (IPRs) can broadly be divided into 3 major types:

PATENT - A patent is used for preventing unique creation from being used, sold, by another party for a set time period. In short, a sovereign authority grants the IP right to the inventor after evaluating its feasibility w.r.t. novelty, inventive step(s) & industrial applicability

COPYRIGHT - It secures a tangible form of expressions like music, painting or a book - it does not shield the idea, but how the idea is expressed. Copyright registration is one of the most widely used IP right granted to the authors for their original creative work including both published and unpublished work.

TRADEMARK - It includes the name and identifying logo or design that a company or individual uses to differentiate itself from his rivals. This unique design or symbol makes it easy for a customer to easily identify with products and services and connect with the brand value of the business.

Ideas on their own in the form of Invention, Innovation or Creativity have little or no value, which can be expressed into two ways - they can either be published or secured through IPR:

The drawback associated with publishing the invention is that it can no longer be patented by the original inventor. Furthermore, publication will disclose the invention to competitors. Improvements might be patented by a third party and this might block the further development of the initial invention.

IPR, on the other hand, has great untapped potential to turn your ideas into commercially successful goods and services. Registering your patients and copyright can result in a steady stream of royalty and extra revenue, which can improve the overall business bottom line.

In other words IPR is a process of converting Saraswati to Laxmi.

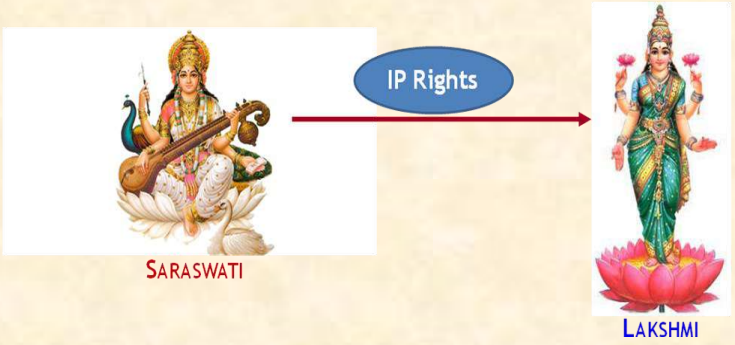
Other advantages of IPR include:

- A patent gives the right to stop others from copying, manufacturing, selling or importing invention without permission of patentee.
- Provides protection for a pre-determined period, allowing patentee to keep competitors at bay. Patentee can license their patent for others to use it or patentee can out rightly sell it.

IPR are accepted all over the world due to some intrinsic important reasons including:

- It provides incentive to the individual for new creations
- Provides due recognition to the creators and inventors
- Ensuring the material reward
- Ensuring the availability of the original products
- For economic growth and advancement in technology sector, protection of Intellectual property protection is important

Tangible benefits for the growth of the business in the field of technology.



IPR is a process of converting Saraswati to Laxmi

IPR protection, therefore, is significant for any university/academic institution working on disruptive technologies. In an academic ecosystem, patents, trademarks, copyrights and designs are all gaining increasing significance alongside a dramatic rise in other types of IPR protection such as trade secrets and non-disclosure agreements since managing IP effectively will ensure protection of ideas while also offering the opportunity of monetizing them.

Additionally, an IPR, when secured at an appropriate time, can give rise to more than one publication too.

In nutshell:

- IP Protection in the present day context is rather indispensable and universities/academic institutions must, therefore, have poignant policy for protecting Intellectual Property Rights.
- It is high times for academic world to duly recognize the IP rights of their innovators and researchers.
- In order to finally improve the IP ecosystem in the university/academic institution and to ensure the long-term strategy for intellectual and economic development of innovators and researchers, university/academic institutions need to strike a perfect balance on how to secure the Intellectual Property Rights of innovators and researchers.
- The IPR policies should neither be too strict nor too lenient for unleashing the culture of innovation & creativity.