



# Poornaprajna Institute of Scientific Research

PROMOTED AND MANAGED BY ADMAR MUTT EDUCATION FOUNDATION (AMEF)  
Recognised by Department of Scientific & Industrial Research (DSIR) Govt. of INDIA and MAHE, Manipal

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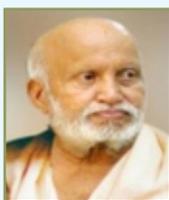
## Newsletter

### *In this issue*

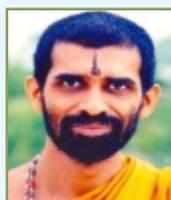
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### *In the news*

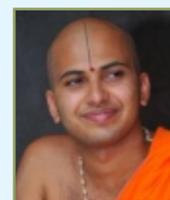
- ★ Three students were awarded Ph.D. by MAHE, Manipal.
- ★ Three new industry projects sponsored by HPCL, DNTL and SAPTPL have been initiated.
- ★ Two Patents (US and Indian) were granted to HPCL in which PPISR researchers are co-inventors.
- ★ Dr. Sanjeev P. Maradur received "Awards for Research Publications" (ARP) from VGST, Government of Karnataka.
- ★ Dr. D.H.K. Murthy, new Assistant Professor joined to work in Materials Sciences and Catalysis Division.
- ★ Four Ph.D. students were awarded prestigious CSIR-SRF research fellowship by Govt. of India in 2020.
- ★ Ten best presentation awards were received by PhD students in 2020 at National and International conferences.
- ★ Ms. Marilyn DMello, PhD student, won the Dr. K.V. Rao Young Scientist Research Award 2020.



**H. H. Sri Vibudhesha Theertha Swamiji, Founder, (1928 - 2009)**



**H.H. Sri Vishwapriya Theertha Swamiji, Chairman**



**H.H Sri Eshapriya Theertha Swamiji Vice-Chairman**

### *Vision*

**To promote and nurture excellence in the fundamental and applied sciences for the advancement of scientific knowledge and the benefit of mankind.**

### *From the Director's Desk*



I have great pleasure in presenting the 11th volume of Newsletter highlighting the overall research activities of PPISR. The beginning of the New Year started with collaborative research activity by signing an MOU between PPISR and Indo-Korea Science and Technology Centre (IKST). Subsequently, a week-long Research Orientation Workshop with the theme of "Today's Science for Tomorrow's Scientists" for grade IX students of PPEC, Bengaluru was organised at PPISR. I feel happy that all the research activities of PPISR came back to normal soon after the end of lockdown period and no Covid-19 cases happened in the campus. Our Founder's Day was celebrated by organizing scientific seminars by both faculty members as well as research scholars of PPISR.

The Institute has published 25 research papers and 2 Book chapters in International reputed journals. One US and one Indian Patent were granted to HPCL for a collaborative research project, in which, PPISR

researchers are co-inventors. This year's other events and achievements are as follows. Dr. D.H.K Murthy joined PPISR as Assistant Professor to work in the area of Materials Sciences and Catalysis. Dr. Sanjeev PM received "Award for Research Publication (APR) by VGST, Govt. of Karnataka, PPISR has initiated three new industry projects on "Catalyst Development and Process" sponsored by Hindustan Petroleum Corporation Ltd. (HPCL), Deepak Novochem Technologies Ltd., Pune and Sravathi Advanced Process Technologies Pvt Ltd, Bengaluru

Three students, Dr. Vasudeva Rao, Dr. Kavitha KN, and Dr. Archana KM have been awarded PhD degree by MAHE, Manipal. During this tenure, four doctoral students were selected for CSIR-SRF award, 10 students received best presentation awards and Ms. Marilyn DMello, PhD student, received Dr. K V Rao Young Scientist research award.

Karnataka Bank Limited has provided financial support for the installation of 48KW solar power plant at Bidalur campus. Recently, our research scholars have initiated "PPISR activity forum" was initiated to showcase the hidden talents like paintings, sketches, write-ups, poems etc.

On the whole, the entire year of 2020 was most satisfying, productive and successful. All these successful developments were possible due to the excellent support and guidance received from H H Sri Vishwapriya Theertha Swamiji and Admar Mutt Education Foundation Management and the cooperation from the faculty members, students, and staff of PPISR.

**Dr. A. B. Halgeri**

### *Editorial*



It gives me immense pleasure to invite all of you to read this issue of Newsletter, which covers the research highlights and scientific achievements of PPISR for the year 2020. Even though Covid-19 pandemic halted research progress across the world, students and scientists of PPISR have done extremely well in their respective areas of research. This

issue covers publications in peer reviewed Journals including Nature publishers, best poster awards, Ph.D. awards, details of sponsored projects etc. achieved during this period. Special thanks to my colleagues and students Mr. Ranjith Kumar and Mr. Rahul Shrama for their dedicated help in editing this newsletter. I feel happy to be the editorial of this issue of newsletter and hope it conveys to the reader the excellent research progress, the institute has achieved.

**Dr. Sujit Sarkar**

## Research highlights- Materials Science and Catalysis Division



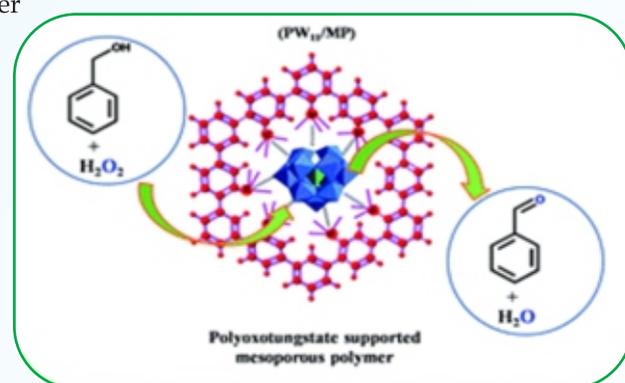
**Dr. Ganapati Shanbhag's** Group conducts research in the area of catalysis for the design of novel catalysts for green chemical processes such as catalytic conversion of CO<sub>2</sub> into value-added chemicals, conversion of biomass by-products like glycerol and furfural to value-added chemicals. The group also works on novel materials design for photocatalysis and gas sensors. During the last one year, the group has published 5 papers in internationally reputed journals. A US patent on "Catalyst composition for converting light naphtha to aromatic compounds and a process thereof" has been granted to HPCL as an outcome of PPISR-HPCL collaborative project.

Three students, Mr. Nagendra Kulal, Mrs. Vaishnavi B. J. and Ms. Marilyn DMello, were awarded Senior research fellowship by CSIR, Govt. of India, New Delhi in 2020. PhD student, Ms. Chethana A. visited Elettra Sincrotrone Facility, Trieste, Italy to carry out experiments sponsored by DST, Govt. of India. Ms. Marilyn DMello received Young Scientist Award from Prestigious Dr. KV Rao Society, Hyderabad. The research scholars have performed very well this year and won seven Best Presentation Awards in national and international conferences. Dr. Shanbhag was invited by C & EN Brand Lab, A subsidiary of ACS to contribute for an E-Book "The Case for Colloidal Silica-How its versatile chemistry can improve diverse products and processes" sponsored by W R Grace & Co company.

A new area of computational studies was initiated by this group with the purchase of material simulation software for performing DFT for catalysis guided by Dr. R. Vetrivel, Honorary Professor. A new two-years industry project on "Catalyst and process development for CO<sub>2</sub> hydrogenation" sponsored by Hindustan Petroleum Corporation Ltd. (HPCL), Govt. of India has been initiated for the period of two years. A Govt. project sponsored by VGST under CESEM grant on "Chemical fixation of CO<sub>2</sub> by converting into value-added chemicals using metal modified mesoporous silicate catalyst" is under progress. Another industry project sponsored by Deepak Novochem Technologies Ltd., Pune on "Catalyst and process development for aromatics alkylation" has been initiated in October 2020 after successful completion of previous project. Overall, this year has been quite an eventful for this group in academic and sponsored research programme.

**Dr. Sanjeev Maradur's** group is working on porous polymers and metal organic framework (MOF) for catalytic applications. Dr. Maradur received "Awards for Research Publications" (ARP) in Metallurgical & Materials Engineering category by Vision Group on Science & Technology, Govt. of Karnataka for 2019-20. Mr. Sathyapal, SRF, the first student from the group, successfully defended his thesis colloquium and submitted his thesis to MAHE, Manipal on 9th Sept 2020. Mr. Kempanna SK, research scholar from the group got the Best Oral Presentation Award at International Conference on Advances in Materials Science and Chemistry" (ICAMSC) (August-10th to 12th -2020) hoisted by Department of Chemistry, Amrita School of Arts and Sciences, Amrita Vishwa Vidyapeetham, Amritapuri Campus, Kollam, Kerala. Dr. Maradur's group contributed a chapter for Publication in ACS Symposium Series: Advanced heterogeneous Catalysts Volume 1: Applications at the Nano-Scale, 2020. The work on valorization of biomass derived alcohols to value added alkylmethyl carbonate products has been published in Scientific Reports journal. Dr. Maradur's group in collaboration with Scientists from Hindustan Petroleum Green R&D Centre has published a work on value addition of bio-glycerol to tert-butyl glycerol ethers, a potential fuel additive molecule for transportation fuels in Sustainable Energy & Fuels, RSC Publication 2020. During this tenure Dr. Maradur's group has published one book chapter and four publications in international journals of high repute.

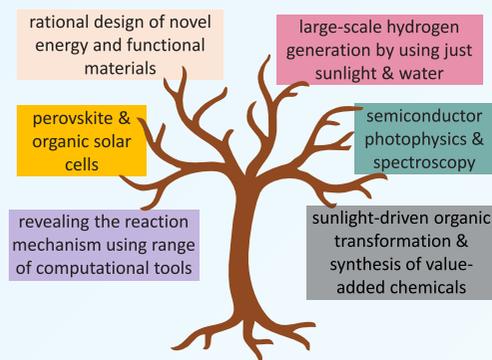
Industry sponsored project from Deepak Nitrite Ltd, Vadodara on selective nitration of alkyl aromatics with Dr Maradur as PI and Dr. Shanbhag as Co-PI has been successfully completed on Dec 2019. A new research proposal has been submitted to Hindustan Petroleum Green R&D center for possible funding to work on mesoporous alumina and it is under consideration. One Student from St. Joseph College Bengaluru worked as summer intern for a period of two months from April till May 2020.



## Research Highlights – Materials Science and Catalysis Division

**Dr. D. H. K. Murthy's** research group has just started their research journey at PPISR. Ms. Sujana. C has joined the group as a new and first Ph.D. student. We innovate novel energy (semiconducting) materials that can efficiently harvest abundantly available solar energy and convert it into chemical or electrical energy. In this direction, the materials design is guided by the insights from computational and spectroscopy studies. Few areas targeted currently are sunlight-driven large-scale hydrogen generation from water splitting, which is reminiscent of natural photosynthesis. In addition, research related to the valorization of biomass, photocatalytic reduction of nitrogen, and gaining mechanistic insight into a chemical reaction using computational approaches are also being conducted. The group is already working collaboratively within India and abroad. Through collaboration with Indo-Korea Science and Technology (IKST) Centre in Bengaluru, we have investigated the optical and electronic properties of visible-light absorbing photocatalysts using density functional theory (DFT) calculations. Besides, by collaborating with Jain University and VTU, the group has published two high-impact research articles.

The current research focus is displayed in the right image. In addition to experiments, the group has extended its activity to computational chemistry. Using the recently acquired Gaussian software, we reveal a chemical reaction mechanism from a kinetic/thermodynamic point-of-view. We are currently exploring novel ideas in this direction.



## Research Highlights – Theoretical Sciences Division



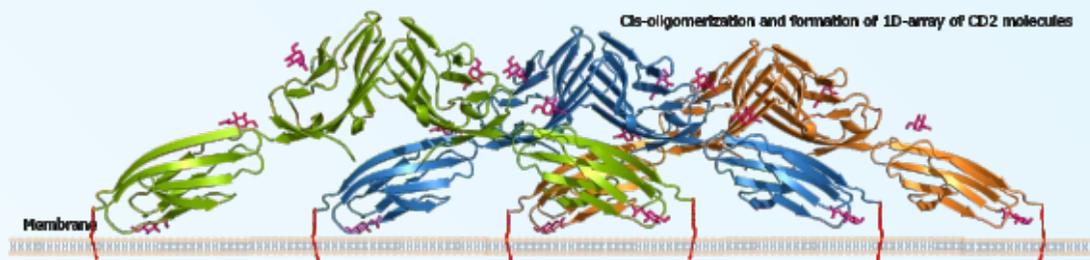
**Dr. R. Srikanth's** group has explored aspects of memory in quantum noise, counterfactual quantum cryptography, quantum temporal correlations under non-Markovian noise, quantum compressed sensing and certain surprising effects of mixing quantum channels. Additionally, the possibility is being explored by setting up a quantum technologies lab and exploiting machine learning (ML) and artificial intelligence (deep neural networks) as an aid to practical quantum applications. A patent filing process is underway along with start-up DEPA for a

ML-aided quantum random number generator. Invited talks were presented by Dr. Srikanth at the Quantum Frontiers & Fundamentals conference held at RRI, Bengaluru (13-18 Jan, 2020). Dr. Srikanth has been visiting a few labs of DRDO (Bengaluru) as a consultant and reviewer. He is also a consultant to two quantum technology startups in Bengaluru. He is a reviewer of some internationally prestigious journals like Phys. Rev. A, Quanta, Physica Scripta, Quantum Information Processing, etc. There are 9 publications from the group in the year 2020, including work with our PhD students as well as national and international collaborators.

**Dr. Sujit Sarkar's** group works on the area of topological state of matter, quantum field theoretical method to quantum many-body systems and theoretical-experimental aspects of topological phases in light-matter interactive system. The group contain three PhD students Rahul S, Ranjith Kumar R and Y R Kartik, who work on the different aspects of quantum many-body system. The group is interested in analyzing the relations of bulk-boundary correspondence for Hermitian as well as non-Hermitian systems, method of curvature renormalization group for multicritical points (Scientific Report 2021), The BKT kind of transitions for PT symmetric as well as PT broken systems (Scientific Report 2020, Physica A 2021) and differential geometric aspects of topological state of matter. The group basically works on the theoretical aspects of quantum many-body system but also have active collaborations with the other leading groups of India as well as in abroad.

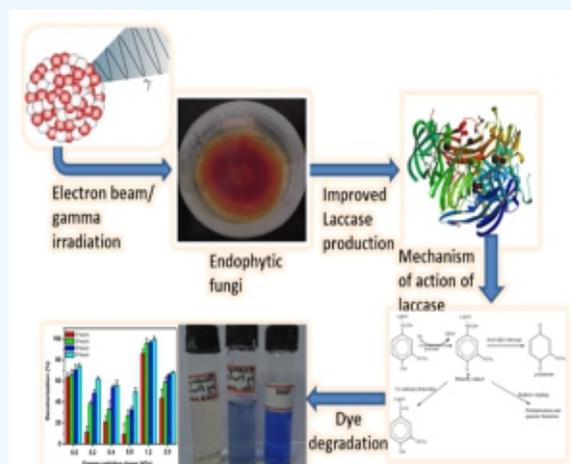
## Research Highlights – Biological Sciences Division

**Dr. Ramagopal's** lab pursues research in the structural biology of immune receptors. The goal is to understand the cis-association preference of cell surface receptors and to design therapeutic molecules for checkpoint blockade cancer immunotherapy. Structural analysis of biologically and medicinally important enzymes are the other interest of the structural biology group. Basically, we are working on the modification of co-stimulatory molecules B7-1/2 and PD-1 to create lead molecules for cancer and autoimmune disorder. We are also working on enzymes involved in conferring antibiotic resistance to bacteria and viral proteases from SARS-COV-2, KFD and Dengue viruses to understand their structure and function and to design drugs to combat these pathogens.



In a recent study we address a simple question- “how does the ectodomain of a membrane-associated protein consisting of multiple domains and connected by flexible linkers stand 'upright' on the membrane?”, surprisingly a question never asked by cell biologists. The results of which is published in BioRxiv (DOI: 10.1101/2020.07.29.226837 ). A careful and systematic analysis based on a large amount of available functional and structural data, looking for a pattern of association of these molecules in the crystal structures and with the concept that 'random things seldom repeat' lead to a surprisingly interesting and consistent observation that the weak cis interaction mediated symmetric oligomerization of constitutively expressed signaling molecules not only support their 'upright' orientation but often bury their ligand-binding surface to avoid spurious signaling. We have also generated several mutants of PD-1 (programmed death-1) towards the creation of lead-molecules for cancer immunotherapy.

**Dr. Ananda K.** and his group's main focus of research during this period was on fungal laccase for the industrial dye degradation or pharmaceutical waste degradation, natural inhibitors for carbohydrate digestive enzyme and bio-conjugated therapeutic proteins for controlling diabetes. Some of these findings are recently published in different peer reviewed journals and few more are under communications. Recently, laccase enzyme producing endophytic fungi was studied for the effect of gamma radiation on laccase gene by carefully sequencing the laccase gene. Another therapeutic protein was modified using bioconjugation chemistry and its properties are very interesting, which might emerge as one of the lead molecules for treating diabetes. In this group one student got PhD award from MAHE, Manipal , one student received CSIR-SRF award and published four research articles in peer reviewed journals.



## PATENTS

1. US 10519387 B2 (Granted) “Catalyst composition for converting light naphtha to aromatic compounds and a process thereof” Assignee: HPCL, Bengaluru. invented by Ravishankar Raman, Peddy Venkat Chalapathi Rao, Nettem Venkateswarlu Choudary, Shanbhag Ganapati, Janardhan Hodala, Halgeri Anand & Gandham Sriganesh Grant date: December 31, 2019.
2. Indian Patent No. 329546 (Granted) “Catalyst composition for converting light naphtha to aromatic compounds and a process thereof” Assignee: HPCL, Bengaluru. invented by Ravishankar Raman, Peddy Venkat Chalapathi Rao, Nettem Venkateswarlu Choudary, Shanbhag Ganapati, Janardhan Hodala, Halgeri Anand & Gandham Sriganesh Grant date: January 16, 2020.

1. Rational design of bifunctional catalyst from KF and ZnO combination on alumina for cyclic urea synthesis from CO<sub>2</sub> and diamine (2020), Kulal, N., John C., Shanbhag, G.V., *Applied Catalysis A: General*, 598, 117550.
2. Exploring the Acidity of Functionalized Mesopolymer Catalyst (P-SO<sub>3</sub>H) for Glycerol tert-butyl ethers Synthesis (2020), K. S. Kanakikodi, S. R. Churipard, G. V. Shanbhag, A. B. Halgeri, C. S. K. Raju, G. Valavarasu, R. S. Reddy, N. V. Choudary, S. P. Maradur, *Sustainable Energy and Fuels*, 4(12), 6299.
3. Polyoxotungstate ([PW<sub>11</sub>O<sub>39</sub>]<sup>7-</sup>) Immobilized on Mesoporous Polymer for Selective Liquid-Phase Oxidation of Alcohols using H<sub>2</sub>O<sub>2</sub> (2020), Sathyapal R. Churipard, Kempanna S. Kanakikodi, Jyoti Roy Choudhuri and Sanjeev P. Maradur, *RSC Advances*, 10, 35988.
4. Sulfonated Mesoporous Polymer (MP-SO<sub>3</sub>H): A Highly Efficient Solid Acid Catalyst for Carboxymethylation of Alcohols to Alkyl Methyl Carbonates (2020), Kempanna S. Kanakikodi, Sathyapal R. Churipard, A. B. Halgeri and Sanjeev P. Maradur, *Scientific Reports*, 10, 13103.
5. Tuning Acidity in Sulfonated Mesoporous Polymer (MP-SO<sub>3</sub>H) for Efficient Tetrahydropyranlation of Alcohols at Room Temperature (2020), Sathyapal R. Churipard, Kempanna S. Kanakikodi, Nileena Jose and Sanjeev P. Maradur, *Chemistry Select*, 5, 293-299.
6. Novel Poly (ionic liquid)-based Anion Exchange Membranes for Efficient and Rapid Acid Recovery from Industrial Waste (2020). Naik, N.; Padaki, M.; Déon, S.; Murthy, D. H. K. *Chemical Engineering Journal*, Vol 401, 1<sup>st</sup> December 2020, 126148.
7. Significantly enhanced cocatalyst-free H<sub>2</sub> evolution from defect-engineered Brown TiO<sub>2</sub>, (2020). Jagadeesh Babu, S. J.; Rao, N.; Murthy, D. H. K.; Shastri, M.; Murthy, M.; Shetty, M.; Raju, A.; Shivaramu, P.D.; Ananda Kumara, C.S.; Shankar M.V.; Rangappa, D., *Ceramic International*, (in press) DOI: 10.1016/j.ceramint.2020.10.026.
8. Molybdenum Carbonyl Grafted on Amine-Functionalized MCM-22 as Potential Catalyst for Iso-Eugenol Oxidation (2020), Sahu, P., Tincy, A., Sreenavya, A., Shanbhag, G. V., Sakthivel, A., *Catalysis Letters*, 10.1007/s10562-020-03388-5.
9. Alkali/alkaline earth ion-exchanged and palladium dispersed MCM-22 zeolite as a potential catalyst for eugenol isomerization and Heck coupling reactions (2020), Sahu, P., Haripriya, T.V., Sreenavya, A., Shanbhag, G.V., Augustin, A., Sakthivel. A., *Journal of Chemical Sciences*, 132 (1), 1-9.
10. Response surface optimization and process design for glycidol synthesis using potassium modified rice husk silica" (2020), Sunaja Devi, K.R., Prasanna, V., D'sa, F., Shetty, K. R., Miranda, J. R., Pinheiro, D., Shanbhag, G. V., *Materials Today: Proceedings* (In press), <https://doi.org/10.1016/j.matpr.2020.05.234>.
11. Alpha glucosidase inhibition activity of phenolic fraction from Simarouba glauca: An in-vitro, in-silico and kinetic study (2020). Kirana M. P., Ananda Kulal. *Heliyon*, 6(7), e04392.
12. Kinetic characterization of purified laccase from *Trametes hirsuta*: a study on laccase catalyzed biotransformation of 1, 4-dioxane (2020). Kavitha K Navada, Ananda Kulal., *Biotechnology Letters*, 1-14. <https://doi.org/10.1007/s10529-020-03038-1>.
13. Enhanced production of laccase from gamma irradiated endophytic fungus: A study on biotransformation kinetics of aniline blue and textile effluent decolourisation (2020). Kavitha Keshava Navada and Ananda Kulal., *Journal of Environmental Chemical Engineering*, 8(2), 103550.
14. Structural insights into N-terminal IgV domain of BTNL2, a T cell inhibitory molecule, suggests a non-canonical binding interface for its putative receptors (2020), Basak AJ, Maiti S, Hansda A, Mahata D, Duraivelan K, Kundapura SV, Lee W, Mukherjee G, De S, Samanta D., *J Mol Biol*, 6;432(22):5938-5950.
15. Emergence of a new symmetry class for Bogoliubov-de Gennes (BdG) Hamiltonians: expanding 10-fold symmetry classes (2020), Ranjith Kumar R and Sujit Sarkar, *Phase Transitions*, 93:3, 287-300.
16. A Study of Interaction Effects and Quantum Berezinskii-Kosterlitz-Thouless Transition in the Kitaev Chain (2020), Sujit Sarkar, *Scientific Reports* 10:2299.
17. Quantum Berezinskii-Kosterlitz-Thouless transition for topological insulator (2020), Ranjith Kumar R, Rahul S, Surya Narayan Sahoo & Sujit Sarkar, *Phase Transitions*, 93:6, 606-629.

## Publications (2020)

18. Convex combinations of Pauli semigroups: Geometry, measure, and an application (2020), Vinayak Jagadish, R. Srikanth and Francesco Petruccione, *Phys. Rev. A*, 101, 062304.
19. Effect of memory on the violation of Leggett-Garg inequality (2020), Javid Naikoo, R. Srikanth and Subhashish Banerjee, *Quantum Information Processing*, 19, 408.
20. Distinguishing environment-induced non-Markovianity from subsystem dynamics (2020), Javid Naikoo, R. Srikanth and Subhashish Banerjee, *International Journal of Quantum Information*, 2050042.
21. Convex combinations of CP-divisible Pauli channels that are not semigroups (2020), Vinayak Jagadish, R. Srikanth and Francesco Petruccione, *Physics Letters A*, 384(35) 126907.
22. Ping-pong quantum key distribution with trusted noise: non-Markovian advantage (2020), Shrikant Utagi, R. Srikanth and Subhashish Banerjee, *Quantum Information Processing*, 19, 366.
23. Temporal self-similarity of quantum dynamical maps as a concept of memorylessness (2020), Shrikant Utagi, R. Srikanth and Subhashish Banerjee, *Scientific Reports*, 10, 15049.
24. Compressed-sensing tomography for qudits in Hilbert spaces of non-power-of-two dimensions (2020), Revanth Badveli, Vinayak Jagadish, R. Srikanth and Francesco Petruccione, *Phys. Rev. A*, 101, 062328.
25. Dynamics of quantum correlations in a Qubit-Oscillator system interacting via a dissipative bath (2020), Revanth Badveli, Vinayak Jagadish, S. Akshaya, R. Srikanth and Francesco Petruccione, *Open Systems & Information Dynamics*, 27, 2050004.

## Book Chapters

1. "Metal Nanoparticles Supported Mesoporous Polymers: Realizing the Synergetic Effect to Achieve Superior Catalytic Performance" S. R. Churipard, K. S. Kanakikodi, Sanjeev P. Maradur, Book Chapter Accepted for Publication in ACS Symposium Series: Advanced heterogeneous Catalysts Volume 1: Applications at the Aano-Scale Chapter 16 (2020) 483-511,
2. Dr. Ganapati Shanbhag was invited by C & EN Brand Lab, A subsidiary of ACS to contribute for an E-Book "The Case for Colloidal Silica-How its versatile chemistry can improve diverse products and processes". It is Sponsored by W R Grace & Co a leading manufacturer of especially chemicals and Catalyst technologies.

## Highlights of Research Activities

- \* Three students, Mr. Vasudeva B. Rao, Ms. Kavitha K Navada and Ms. Archana K N received PhD degree from MAHE, Manipal and one student, Mr. Sathyapal C submitted PhD thesis for the PhD award.
- \* Dr. Ganapati V. Shanbhag (PI) and Dr. S. P. Maradur (Co-PI) were awarded a new project on "Design and development of catalyst and process for alkylation of aromatics" sponsored by Deepak Novochem Technologies Ltd, Pune.
- \* Dr. Sanjeev P. Maradur received "Awards for Research Publications" (ARP) Science and Technology Department of IT, BT and S & T, Government of Karnataka, during the year 2019-20.
- \* Ms. Marilyn DMello, PhD student, won Dr. K.V. Rao Research Award as Young Scientist by prestigious Dr. K.V. Rao Scientific Society, Hyderabad in September 2020.
- \* Mr. Shankar Kundapura has been selected for the DST-Ph.D. Fellowship Programme of Dept. of Science and Technology (DST), Govt. of Karnataka.
- \* Three students, Mr. Nagendra Kulal, Mrs. Vaishnavi B. J. and Ms. Marilyn DMello, students of Dr. Ganapati Shanbhag attended personal interview for CSIR-SRF, Govt. of India, New Delhi and all the three were selected for prestigious CSIR-SRF award.
- \* Ms. Shrilakshmi S, student of Dr. Ananda K (PI) and Dr. Udipi Ramagopal (Co-PI) from Biological Sciences attended personal interview for CSIR-SRF, Govt. of India and selected for prestigious CSIR-SRF award.
- \* Dr. Ramagopal's lab signed MTA with the University of Oulu, Finland for acquiring CyDisCo plasmids, which are extremely helpful in the large-scale expression of disulfide-containing proteins.

## Highlights of Research Activities

- \* Mr. Kempanna SK, got the BEST ORAL Presentation Award at International Conference on “Advances in Materials Science and Chemistry” (ICAMSC) organised by Department of Chemistry, Amrita School of Arts and Sciences, Kerala during August 10-12, 2020.
- \* Ms. Vaishnavi B. J. received 1<sup>st</sup> prize for BEST ORAL presentation at 3-days International conference on "Emerging Trends in Catalysis" organized by Vellore Institute of Technology-Vellore in association with Royal Society of Chemistry (RSC), UK.
- \* Mr. Nagendra Kulal has won BEST POSTER presentation at 11<sup>th</sup> Bengaluru India Nano, A prestigious International Conference on theme New Dimensions in Nano Science & Technology for his presentation held during March 2-3, 2020.
- \* Ms. Chethana A. won BEST ORAL Presentation award at "International Conference on Advances in Chemistry (ICACSEM-2020) organized by University of Madras, Chennai held during the January 9-10, 2020.
- \* Ms. Archana received the BEST ORAL presentation award in the 2<sup>nd</sup> International conference on Advanced Materials & Technology at JSS Science & Technology University, Mysore from January 16-18, 2020.
- \* Mr. Nagendra Kulal and Ms. Vaishnavi BJ won BEST ORAL presentation award at National Conference on “Frontiers of Catalysis Science & Technology and its applications” held at St. Joseph's College , Bengaluru on January 10-11, 2020.
- \* Dr. Ganapati Shanbhag gave invited lecture at Central University of Kerala, Kasargod during “National Training Course” on “Prerequisites to Resent Advances in Catalysis” held from December 16 to 20, 2019.
- \* Dr. Ganapati Shanbhag gave an invited lecture at National Conference on “Frontiers of Catalysis Science & Technology and its applications” held at St. Joseph's College , Bengaluru on January 10-11, 2020
- \* Dr. Ganapati Shanbhag was delivered invited talk in "Late krishna T. Bhagwat Memorial Endowment Lecture Series" on 10-2-2020 at Dr. A. V. Baliga College of Arts & Science, Kumta.
- \* Dr. Ganapati Shanbhag delivered an invited lecture at 3-days International E-Symposium GITAM-IEON-2020 organized by Gitam (Deemed to be) University, Bengaluru during July 20 - 22, 2020.
- \* Dr. Ganapati Shanbhag gave a lecture as a resource person in the “Virtual Refresher Course on Material Characterization” jointly organized by Ceramic Society of India, Karnataka Chapter and VTU, Belagavi.
- \* Dr. Ganapati Shanbhag was a member of the Technical Committee and Session Chair for the National Conference on “Frontiers of Catalysis Science & Technology and its applications” held at St. Joseph's College , Bengaluru during January 10-11, 2020.
- \* Ms. Chethana A. received travel award from Dept. of Science and Technology, Govt. of India to visit Elettra Sincrotrone Facility, Italy to carry out her experiments. All the expenses of her accommodation and food was sponsored by the Italian Government and managed by Eletra.
- \* Dr. Ananda K and student Ms. Shrilakshmi S. made a research collaboration with St. Aloysius College Mangalore for the “Animal Studies” and Ms. Shrilakshmi completed training on preclinical studies on mouse model from which she gained experience in handling winstar rats used as diabetic models.
- \* Ramaiah Institute of Technology in collaboration with PPISR organised Faculty Development Programme for faculty and forty participants from this workshop participated in the one day lecture workshop at PPISR campus.
- \* Dr. Maradur Delivered an invited talk in biannual lectures on Advanced Materials conducted by CMR Institute of Technology Bengaluru on 14<sup>th</sup> November 2019
- \* Dr. Ramagopal delivered a talk in the national Conference on "Synergetic Research Development in Chemical, Biological and Environmental Sciences" held at GITAM Deemed to be University, Bengaluru on March 12, 2020.
- \* Memorandum of understanding (MOU) between Poornaprajna Institute of Scientific Research and Indo-Korea Science and Technology Center (IKST), Bengaluru was signed.
- \* Dr. Ramagopal delivered a talk in the Faculty Development Programme on Recent Trends in Biological and Environmental Sciences, (RTBES-2020) organised by at Ramaiah Institute of Technology, Bangalore, on January 18, 2020.

## Activities In The Institute

### Ph.D. Degree Award



**Mr. Bakuru Vasudeva Rao:** The open defense of the Ph.D. thesis titled, “Metal-Organic Frameworks (MOFs) and their Nanohybrids for Synergetic Heterogeneous Catalysis” by Mr. Bakuru Vasudeva Rao was held on March 12, 2020. Mr. Bakuru Vasudeva Rao's PhD thesis was supervised by Dr. Suresh K Babu of Materials Science and Catalysis Division. Mr. Vasudeva Rao was awarded PhD from Manipal Academy of Higher Education, Manipal on November 28, 2020

**Ms. Kavitha K Navada:** Ph.D. defence viva of Ms. Kavitha K Navada of Biological Sciences Division was held on July 20, 2020. Her thesis title was “Studies on effect of radiation on laccase producing endophytic fungi and applications of fungal laccase” and was guided by Dr. Ananda K, Associate Professor, Biological Sciences. Ms. Kavitha K N received her PhD degree from Manipal Academy of Higher Education on July 20, 2020.



Ph.D. defence Viva of Ms. Archana K. M was held on November 28, 2020. The title of her thesis was “Design of alkali rare earth double tungstates for photoluminescence, electrochemical and theranostic applications”. Dr. Nalini G Sundaram, Associate Professor from Materials Science and Catalysis Division guided her PhD. Manipal Academy of Higher Education, Manipal awarded PhD degree to Ms. Archana K M on November 28, 2020.

### New Industry Sponsored Projects



An industry project sponsored by Hindustan Petroleum Corporation Ltd on “Catalyst and process development for CO<sub>2</sub> valorization” was initiated in January 2020 by Ganapati Shanbhag as Principal investigator and Dr. R. Vetrivel and Dr. Sanjeev Maradur as Co-PIs for the period of 2 years. This is the 4<sup>th</sup> project sponsored by HPCL after successfully completing 3 projects with them since 2012. Deepak Novochem Technologies Ltd, Pune also sponsored a 1-year project to Dr. Shanbhag's group on “Catalyst and process development for alkylation of aromatics” from October 2020. They previously sponsored their 1<sup>st</sup> project during 2018-2019 and the collaboration with DNTL is continued in 2020-2021. The 3<sup>rd</sup> project this year was sponsored by Sravathi Advanced Process Technologies Pvt Ltd, Bengaluru to Dr. Sajneev Maradur on “Development of solid catalysts for aromatic hydrogenation reactions” in 2020. Overall, three industry sponsored projects have been executed in Materials Science and Catalysis Division this year

### New Faculty

**Dr. D. H. K. Murthy** has joined the Materials Science and Catalysis division as a new faculty. He obtained his Ph.D. from Delft University of Technology (TU Delft), The Netherlands, in 2014. Before joining PPIISR, he has conducted advanced research at various international institutes of high-repute like AIST/Tokyo University in Japan and Nanyang Technological University (NTU) in Singapore. He has carried out extensive research activity related to energy materials, solar cells, photocatalytic reactions, spectroscopy, and computational chemistry. At PPIISR, he aims to innovate novel energy materials based on rational insights learned through computational and spectroscopy tools. For the next few years, he will elucidate the correlation between structure-property-function to design better



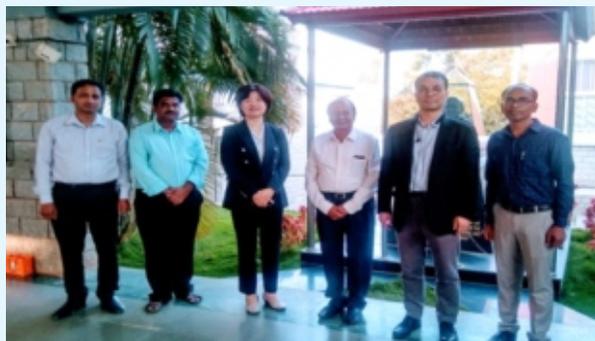
## Activities In The Institute

materials to enhance sunlight-driven hydrogen generation efficiency. In this endeavor, he is closely working with researchers within India and abroad. He is actively seeking funds to strengthen his group further and expedite the research activities. If you cannot see him in the lab, he will be busy doing any of the following; sprinting, enjoying racquet-based sports, trekking, and playing with his kid..

### MOU signed with IKIST

Memorandum of understanding (MOU) between Poornaprajna Institute of Scientific Research and Indo-Korea Science and Technology Center (IKST), Bengaluru was signed on December 20, 2019 at IKST campus. The Directors, Dr. A. B. Halgeri (PPISR) and Dr. Seung Cheol Lee (IKST) signed the MOU on behalf of their respective organizations. Both the institutes have agreed to work together on joint research projects, exchange of researchers, joint events etc.

Dr.(Ms) Sang Kyung Kim, Director, International Affairs, Korea Institute of Science and Technology, Republic Korea and IKST Director, Dr. Seung Cheol Lee visited PPISR on 30<sup>th</sup> January, 2020 and discussed various avenues for collaboration.



### AMEF Board of Trustees Meeting

AMEF Board of trustees meeting was held on December 5, 2020. Trustee members discussed on different issues related to the Poornaprajna Institute of Scientific Research. Dr. A B Halgeri presented the overall highlights of PPISR research activities and all the Trustee members highly appreciated the achievement of PPISR and congratulated Dr. Halgeri for the progress of all research activities. H H Sri Vishwapriya Theertha Swamiji released the Annual Report and Brochure of PPISR



### Honoring Ph.D. Awardees

In recognition of their excellent performance in research at PPISR with publications in highly reputed international journals, three past PhD students of PPISR who received their degree in 2020; Dr. Vasudeva Rao, Dr. Archana K. M and Dr. Kavitha Navada were honored by AMEF Chairman, HH Sri Vishwapriya Theertha Swamiji during AMEF Board of Trustees meeting on December 5, 2020 at PPISR Sadashivnagar Campus.



### Founder's Day Celebration

Every year PPISR celebrates 'Founder's Day' in the memory of H H Sri Vibhudesha Theertha Swamiji. The celebration of 11<sup>th</sup> Founder's Day for the year 2020 was organized at Bidalur. Founder's Day was celebrated on July 02, 2020 at PPISR campus following all the Covid-19 precautions. The programme began with garlanding the bust of Founder Chairman followed by invocation, welcome address by the Director and lighting of the lamp. "Preamble on H H Sri Vibudhesha Teertha Swamiji" was given by Dr.Ananda K and

"Overview on progress of PPISR during last decade" was given by Dr. Ganapati V Shanbhag. The inaugural speech was given by Dr. Udupi Ramagopal, Dean Academics on the hot subject of Covid-19. A talk was also presented by one of the PhD students Mr. Nagendra Kulal on "Methanol synthesis from CO<sub>2</sub> hydrogenation process: From catalyst design to technology development". During the post lunch session Dr. R. Srikanth gave a lecture on "Quantum technologies: strengths and



## Activities In The Institute

challenges". Later the recordings of benediction by HH Sri VishwapriyaTeertha Swamiji was played on the screen before the vote of thanks. In the evening, in memory of Founder Chairman, a few saplings were planted to make the campus greener.

### Outreach Programs



**PPEC Bengaluru:** In the beginning of the year 2020 we have organised out reach program for grade IX students of Poornaprajna Education council (PPEC), Bengaluru. This is the 7<sup>th</sup> out reach programme conducted for a week on the title "Research Orientation Workshop for of grade IX students of PPEC" at PPISR, Bidaluru. This program is aimed to educate young students and create an enthusiasm towards science and research. PhD students of PPISR from all the divisions from Chemistry, Biology and Theoretical Physics presented and explained various experiments from their respective field of research.

Students of high school were very much excited with the interesting experiments shown to them and had interacted actively with the PhD students. Dr. Ananda in association with the faculty and administrative officer Mr. Kishore Gaikwad organized this program successfully. This out reach program is getting lot of appreciation from the Poornaprajna School, students as well as from the parents of children.

**Vihan Public School, Devanahalli:** PPISR is also conducting out reach program for the students of Schools located near the PPISR campus . This time Vihan Public School in association with PPISR organized an inter-school science exhibition and a debate on rain water harvesting and preservation of water. Faculty Dr. Ananda K and Dr. R. Srikanth along with PhD students Ms. Swetha L and Mr. Rahul S contributed as juries for the science exhibition. Many students from different schools in Bengaluru and nearby districts participated and PPISR faculty inspired them by speaking about advantages of advanced Science research

**PPC Udupi:** A week long "Research Orientation Workshop" for the BSc students of Poornaprajna College, Udupi organised at PPISR, Bidaluru campus. This workshop was inaugurated by Prof. Pandurangappa, Registrar of Bengaluru University and he delivered the key note lecture. PPISR Director Dr. A.B.Halgeri presided the inaugural function. The residential workshop contained mixture of lectures and hands on experiments arranged for the undergraduates at PPISR research lab. There were seven lectures on different aspects of Materials Science and Catalysis related subjects , four lectures on Physics and three lectures on Biological Sciences were given by the faculty and PhD students of PPISR during this workshop. Every day afternoon experiments were arranged for the BSc students by the PhD students of PPISR to get the flavour of research in the laboratory. The workshop valedictory address was given by Dr. Harish P, Dean of Sciences, Nagarjuna College of Eng. Chikkaballapura. This workshop was very interactive and many students of Poornaprajna college interacted well with the PhD students and faculty for the better clarity of their doubts.



## PPISR Activity Forum



Display of different activities

Recently students of PPISR initiated some extracurricular activity and formed 'PPISR Activity Forum' a platform to nurture and perform the creative skills by all the members of PPISR. Various creative programs are being organized every month in the PPISR campus. In two editions of this activity forum many paintings, sketches, write-ups, poems etc. both from students and faculty have been displayed. This forum will provide opportunity for everyone to showcase their hidden talents in different fields.

## Solar Power Plant Implementation



At the request of PPISR, The Karnataka Bank, the close Banking Associate of Admar Mutt Group of Institutions, has come forward to provide support for the installation of solar power plant at our Bidalur Campus under the Bank's CSR initiative. In concern with the above fact, one of the representatives from Karnataka Bank Sri Srinivasa Deshapande, Head, CSR, Karnataka Bank, Registered and Head Office Mangaluru visited the labs, proposed areas for installing the solar panels and had discussions on the proposed solar plant to be set up at our Bidalur Campus.

The Karnataka Bank supported PPISR under the CSR green initiative project to set up the photovoltaic solar power plant at our Bidalur Campus. It has a capacity of 48KVA generating unit which will provide power supply to the entire campus, thus making the green campus into greener and eco-friendly campus. PPISR thanks Karnataka Bank for their whole hearted support to PPISR. The solar plant will be inaugurated by Shri Mahabaleswara M.S., MD and CEO, Karnataka Bank Limited in the August presence of H H Sri Vishwapriya Theertha Swamiji on February 20, 2021

## Visitor's Views

**V.K. Gupta**, Senior Vice President and Head-Polymers, Reliance Research and Development Centre, Mumbai.

Congratulations to Prof. Halgeri and his team for creating the ecosystem for creativity and interest in faculty members and Research Students to do high impact research for societal benefits. A very strong discipline culture in the team with creativity will go long way in continuous flow of future scientific leaders for many years. Good wishes to all.

**Prof. Pandurangappa**, Registrar, Bengaluru Central University, Bengaluru.

Congrats to Dr. Halgeri and his team for maintaining the facilities and the scientific instruments. Mainly focussed on the Catalysis research work. A very good research team comprising faculty and research students provide a good research atmosphere in the institute.

**Dr. V. Gayathri**, Bengaluru Central University, Bengaluru.

I congratulate Dr. Halgeri for his excellent work in building of Poornaprajna Institute. The laboratories and infrastructure are excellent.

## Poornaprajna Analytical Center

**New Analytical Instrument Installed:** A new analytical instrument STA-6000 (Perkin Elmer) to analyze TGA/DTA/DSC measurements was procured under the VGST CESEM project grant (GRD 307) and was installed at Poornaprajna Analytical Centre.

### Instruments available for external users

- X-Ray Diffractometer (Bruker) • FTIR Spectrophotometer (Bruker)
- Atomic Absorption Spectrophotometer (Perkin Elmer) • UV-Vis Spectrophotometer (Perkin Elmer)
- Fluorescence Spectrophotometer (Agilent)
- Simultaneous Thermal Analyzer (TGA-DTA, DSC Perkin Elmer)

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