

## **PERSONAL DETAILS**

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Gender: Male  
DOB: 07-06-1985  
Nationality: India

## **EDUCATION**

7/2011-7/2017	Ph.D in Materials Chemistry, Jawaharlal Nehru Centre for Advanced Scientific Research, Bengaluru, India
6/2007-6/2009	M.Sc in Chemistry, Department of Chemistry, University of Mysuru, Mysuru, India.
6/2004-6/2007	B.Sc (Physics, Chemistry and Mathematics), Bharathi College, Bharathinagara, India.

## **RESEARCH EXPERIENCE**

7/2017-09/08/2021	Postdoctoral Research Associate, Jawaharlal Nehru Centre for Advanced Scientific Research, Bengaluru, India. <b>Research Advisor: Prof. C. N. R. Rao</b> Novel 2D Nanocomposites for the Hydrogen Evolution Reaction.
2/2018-8/2018	Visiting Research Fellow, School of Science, Royal Melbourne Institute of Technology, Melbourne, Australia.
7/2011-7/2017	Ph.D in Materials Chemistry, Jawaharlal Nehru Centre for Advanced Scientific Research, Bengaluru, India. <b>Research Advisor: Prof. C. N. R. Rao</b> Investigations of Carbon Nanohorns and Covalently-linked Nanocomposites of Nanocarbons and other 2D Materials.

## **TEACHING EXPERIENCE**

2/2020-09/08/2021	Coordinator, Project Oriented Chemical Education, Engineering Technical Unit, Jawaharlal Nehru Centre for Advanced Scientific Research, Bengaluru, India.
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09/08/2021-Till date

Assistant Professor, Centre for Nano and Material Sciences,  
Jain University, Jakkasandra, Bengaluru, India.

Here, I have taught Chemistry of Biomolecules (30 hr),  
Advanced Surface Chemistry (10 hr), Semi-micro qualitative  
analysis of mixtures containing two each of common cations and  
anions and one of the rare earth metals (30 hr) and Preparation  
and Quantitative analysis of inorganic complexes (10 hr) for Masters  
students

### **RESEARCH INTERESTS**

- ❖ Synthesis of novel 1D/2D nanomaterials for catalysis applications.
- ❖ Synthesis of heterostructures by covalent cross-linking and electrostatic reatcking strategy to complement thedisadvantages of commonly used 2D materials for catalysis.

### **RESEARCH SUMMARY**

C<sub>3</sub>N<sub>4</sub>, MoS<sub>2</sub>, borocarbonitride and nitrogenated RGO (NRGO) are some of the important catalytic layered materials investigated for the hydrogen evolution reaction (HER) reaction, but the observed catalytic activities are somewhat marginal. An appropriate combination of 2D materials can enhance the activity by synergistic effects, but a mere composite mixture would not be fruitful. In order to bring an appreciable improvement in catalytic activity based on more than one 2D structure, I synthesized covalently cross-linked heterolayers of graphene-MoS<sub>2</sub>, MoS<sub>2</sub>-MoS<sub>2</sub>, MoS<sub>2</sub>-C<sub>3</sub>N<sub>4</sub>, MoS<sub>2</sub>-BCN, phosphorene-MoS<sub>2</sub>, phosphorene-C<sub>3</sub>N<sub>4</sub> and phosphorene-BCN by employing coupling reactions. Photocatalytic H<sub>2</sub> evolution with the phosphorene–MoS<sub>2</sub> nanocomposite is found to be noteworthy, showing an activity of 25734 μmol h<sup>-1</sup> g<sup>-1</sup>. The BCN–MoS<sub>2</sub> nanocomposite shows outstanding electrochemical HER activity with a Tafel slope of 33 mVdec<sup>-1</sup> close to that of Pt. Presently, I am working on integrating N-heterocyclic carbenes complexes containing metal atoms such as Au, Ag, Pt with 2D materials such as C<sub>3</sub>N<sub>4</sub>, MoS<sub>2</sub>, borocarbonitride to enhance catalytic activity mainly for electrocatalytic hydrogen evolution reactions.

### **AWARDS/FELLOWSHIPS**

- 2018 “**Visiting Research Fellowship**” RMIT, Melbourne, Australia.
- 2018 “**Best Presentation Award**” in International Winter School held at Bengaluru.
- 2016 “**Best Poster Award**” in Chemical Frontiers held at Goa.
- 2014 “**Best Poster Award**” in Indo-Japan conference held at Bengaluru.
- 2011 Qualified CSIR-JRF (**All India 67<sup>th</sup> Rank**).

## **LIST OF PUBLICATIONS**

1. H. K. Beere, K. V. Yatish, K. Aravind, D. Ghosh, R. G. Balakrishna and **K. Pramoda**, *Int. J. Hydrogen Energy* 2024, *54*, 1582-1592. Unveiling favorable synergy of tubules-like NiMoSe<sub>2</sub> with defect-rich borocarbonitride over graphene or MXene for efficient hydrogen evolution reaction electrocatalysis (**IF:7.139**)
2. A. Patra, **K. Pramoda**, S. Hegde, K. Aravind, K. Mosina, Z. Sofer and C. S. Rout *Dalton Trans.* *53*, 2380. Electrostatic co-assembly of FePS<sub>3</sub> nanosheets and surface functionalized BCN heterostructures for hydrogen evolution reaction. (**IF:4.5**)
3. **K. Pramoda** and C. N. R. Rao, *J. Mater. Chem. A*, 2023, *11*, 16933. 2D transition metal-based phospho-chalcogenides and their applications in photocatalytic and electrocatalytic hydrogen evolution reactions. (**IF:11.9**)
4. DB Nityashree, SM Anush, **K Pramoda**, K Prashantha, YR Girish, H Nagarajaiah, *Mater. Res. Bull.* 2024, *169*, 112489. Construction of Z-Scheme MoS<sub>2</sub>/ZnFe<sub>2</sub>O<sub>4</sub> heterojunction photocatalyst with enhanced photocatalytic activity under visible light. (**IF:5.4**)
5. **K. Pramoda** and C. N. R. Rao, *APL Mater.* 2023, *11*, 020901. Electrostatic restacking of two-dimensional materials to generate novel hetero-superlattices and their energy applications (**IF:6.635**)
6. R Kattimani, K. V. Yatish, **K. Pramoda**, M. Sakar and R. Geetha Balakrishna, *Fuel*, 2023. Acacia furnesiana Plant as a Novel Green Source for the Synthesis of NiFe<sub>2</sub>O<sub>4</sub> Magnetic Nanocatalyst and as Feedstock for Sustainable High Quality Biofuel Production. (Accepted, **IF:8.035**)
7. A. Samage, **K. Pramoda**, M. Halakarni and S. K. Nataraj, *ACS Appl. Energy Mater.* 2023, *6*, 2412. One-Step Rapid Conversion of Electroactive CoMnO Nanostructures Using a Deep Eutectic Solvent as the Template, Solvent, and Source. (**IF:6.959**)
8. K. A. Sree Raj, **K. Pramoda** and C. S. Rout, *J. Mater. Chem. C*, 2023, *11*, 2565. Assembling a high-performance asymmetric supercapacitor based on pseudocapacitive S-doped VSe<sub>2</sub>/CNT hybrid and 2D borocarbonitride nanosheets. (**IF:8.067**)
9. B. Kulkarni, V. Suvina, **K. Pramoda** and R. G. Balakrishna, *J. Electroanal. Chem.* 2023, *931*, 117175. Picomolar, Electrochemical Detection of Paraoxon Ethyl, by Strongly Coordinated NiCo<sub>2</sub>O<sub>4</sub>-SWCNT Composite as an Electrode Material. (**IF:4.958**)
10. S. K. Verma, R. Verma, Y. R. Girish, S. Verma, **K. Pramoda**, Y. Vaishnav, J. Saji, and K. S. Sharath Kumar, *J. Mol. Struct.* 2023, *1281*, 135145. Two-dimensional Ti<sub>3</sub>C<sub>2</sub>T<sub>x</sub> MXenes as a catalyst support for the synthesis of 1, 4-disubstituted-1, 2, 3-triazoles via azide-nitroalkene oxidative cycloaddition. (**IF:3.841**)
11. G. Selvi, N. Chowdary, H. D. Preetham, S. Verma, V. K. Hamsee, M. Umashankara, N Raj,

- K. Pramoda**, and K. S. Sharath Kumar, *J. Mol. Struct.* 2023, 1276, 134661. A short hydrophobic peptide conjugated 3,5- disubstituted pyrazoles as antibacterial agents with DNA gyrase inhibition **(IF:3.841)**
12. **K. Pramoda** and C. N. R. Rao, *ChemNanoMat*, 2022, <https://doi.org/10.1002/cnma.202200153>. **(IF:3.154)**
13. **K. Pramoda**, D. Binwal and C. N. R. Rao, *Mater. Res. Bull.* 2022, 149, 111697. Nanocomposites of nanoparticles of MoS<sub>2</sub> with Carbon nanotubes and Borocarbonitrides, and Their electrocatalytic HER activity. **(IF:4.641)**
14. E. K. Alenezzy, A. E. Kandjani, **K. Pramoda**, M. A. Kobaisi, S. J. Ippolito, Y. Sabri, S. K. Bhargava, *Colloids Surf. A Physicochem. Eng. Asp.* 2022, 652, 129791. Heterostructure colloidal crystal for light activated hydrogen sensing at low temperature. **(IF:5.518)**
15. D. Binwal, **K. Pramoda**, A. Zak, M. Kaur, P. Chithaiah and C. N. R. Rao, *ACS Appl. Energy Mater.* 2021, 4, 2339. Nanocomposites of 1D MoS<sub>2</sub> with Polymer-Functionalized Nanotubes of Carbon and Borocarbonitride, and Their HER Activity. **(IF:6.024)**
16. N. Mahamood, H. Khan, K. Tran, **K. Pramoda**, A. Zavabeti, P. Atkin, K. Khoshamanesh, Y. Li and K. K. Zadeh, *Mater. Today* 2021, 44, 69. Maximum piezoelectricity in a few unit- cell thick planar ZnO–A liquid metal-based synthesis approach. **(IF:31.04)**
17. D. Binwal, M. Kaur, **K. Pramoda** and C. N. R. Rao, *Bull. Mater. Sci.* 2020, 43, 313. HER Activity of Nanosheets of 2D Solid Solutions of MoSe<sub>2</sub> with MoS<sub>2</sub> and MoTe<sub>2</sub>. **(IF:1.392)**
18. **K. Pramoda**, S. Servottam, M. Kaur and C. N. R. Rao, *ACS Appl. Nano Mater.* 2020, 3, 1792. Layered Nanocomposites of Polymer-Functionalized Reduced Graphene Oxide and Borocarbonitride with MoS<sub>2</sub> and MoSe<sub>2</sub> and Their Hydrogen Evolution Reaction Activity. **(IF:5.097)**
19. A. Saraswat, **K. Pramoda**, K. Debnath, S. Servottam, U. V. Waghmare and C. N. R. Rao, *Chem. Eur. J.* 2020, 26, 6499. Chemical Route to Twisted Graphene, Graphene Oxide and BN. **(IF:5.236)**
20. P. Chithaiah, K. Pramoda, G. U. Kulkarni and C. N. R. Rao, *Eur. J. Inorg. Chem.* 2020, 1230. A simple chemical route to borocarbonitride nanotubes. **(IF:2.529)**
21. C. N. R. Rao, **K. Pramoda**, A. Saraswat, R. Singh, P. Vishnoi, N. Sagar and A. Hezam, *APL Materials* 2020, 8, 020902. Superlattices of covalently cross-linked 2D materials for the hydrogen evolution reaction. **(IF:5.096)**
22. P. Vishnoi, **K. Pramoda**, U. Gupta, M. Chhetri, R. G. Balakrishna and C. N. R. Rao, *ACS Appl. Mater. Interfaces* 2019, 11, 27780. Covalently Linked Heterostructures of Phosphorene with MoS<sub>2</sub>/MoSe<sub>2</sub> and their Remarkable HER Activity. **(IF:9.229)**
23. M. Barua, M.M. Monish, **K. Pramoda** and C. N. R. Rao, *J. Mater. Chem. A*, 2019, 7, 22500. Photochemical HER of layered metal phospho-sulfides and -selenides. **(IF:11.3)**
24. P. Vishnoi, **K. Pramoda**, and CNR Rao, *Chem. Nano Mat.* 2019, 5, 1062. Elemental 2D nanomaterials beyond graphene. **(IF:3.154)**

25. C. N. R. Rao and **K. Pramoda**, *Bull. Chem. Soc. Jpn.* 2019, 92, 441. Borocarbonitrides,  $B_xC_yN_z$ , 2D Nanocomposites with Novel Properties. **(IF:5.488)**
26. N. Mohamud, I. Decastro, **K. Pramoda**, K. Koshmanesh, S. K. Bhargava and K. K. Zadeh, *Energy Storage Mater.* 2018, 16, 455. Atomically thin two-dimensional metal oxide nanosheets and their heterostructures for energy storage. **(IF:17.789)**
27. N. K. Singh, A. Soni, U. Gupta, **K. Pramoda** and C. N. R. Rao, *J. Chem. Sci.* 2018, 130, 1. Remarkable photochemical HER activity of semiconducting  $MoS_2$  covalently linked to layers of 2D structures and of the stable metallic 1T phases prepared solvo-or hydro- thermally. **(IF:1.406)**
28. **K. Pramoda**, M. M. Ayyub, N. K. Singh, M. Chhetri, U. Gupta, A Soni and C. N. R. Rao, *J. Phys. Chem. C* 2018, 122, 13376. Covalently Bonded  $MoS_2$ -Borocarbonitride Nanocomposites Generated by Using Surface Functionalities on the Nanosheets and Their Remarkable HER Activity. **(IF:4.189)**
29. N. K. Singh, **K. Pramoda**, K. Gopalakrishnan and C. N. R. Rao, *RSC Advances* 2018, 8, 17237. Synthesis, characterization, surface properties and energy device characteristics of 2D borocarbonitrides,  $(BN)_xC_{1-x}$ , covalently cross-linked with sheets of other 2D materials. **(IF:3.36)**
30. C. N. R. Rao, **K. Pramoda** and R. kumar, *Chem. Commun.* 2017, 53, 10093. Covalent cross-linking as a strategy to generate novel materials based on layered (2D) and other lowD structures. **(IF:5.996)**
31. **K. Pramoda**, U. Gupta, M. Chhetri, A. Bandyopadhyay, S. K. Pati, C. N. R. Rao, *ACS Appl. Mater. Interfaces* 2017, 9, 10664. Nanocomposites of  $C_3N_4$  with Layers of  $MoS_2$  and Nitrogenated RGO, Obtained by Covalent Cross-Linking: Synthesis, Characterization, and HER Activity. **(IF:9.229)**
32. M. Barua, M. B. Sreedhara, **K. Pramoda** and C. N. R. Rao *Chem. Phys. Lett.* 2017, 683, 459. Quantification of surface functionalities on graphene, boron nitride and borocarbonitrides by fluorescence labelling. **(IF:2.029)**
33. **K. Pramoda**, U. Gupta, I. Ahmad, R. Kumar and C. N. R. Rao, *J. Mater. Chem. A* 2016, 4, 8989. Assemblies of covalently cross-linked nanosheets of  $MoS_2$  and of  $MoS_2$ -RGO: synthesis and novel properties. **(IF:11.3)**
34. **K. Pramoda**, M. Kaur, U. Gupta and C. N. R. Rao, *Dalton Trans.* 2016, 45, 13810. Nanocomposites of 2D- $MoS_2$  nanosheets with the metal-organic framework, ZIF-8. **(IF:4.052)**
35. **K. Pramoda**, K. Moses, U. Maitra and C. N. R. Rao, *Electroanalysis* 2015, 27, 1892. Superior Performance of a  $MoS_2$ -RGO Composite and a Borocarbonitride in the Electrochemical Detection of Dopamine and Uric Acid. **(IF:3.012)**
36. **K. Pramoda**, S. Kadambi, U. Ramamurty and C.N.R. Rao, *ACS Appl. Mater. Interfaces* 2015, 7, 17016. Carbon-nanohorn-reinforced polymer matrix composites: synergetic benefits in mechanical properties. **(IF:9.229)**

37. **K. Pramoda**, R. Kumar and C. N. R. Rao, *Chem. Asian J.* 2015, *10*, 2147. Graphene/Single-Walled Carbon Nanotube Composites Generated by Covalent Cross- Linking. **(IF:4.568)**
38. S. Bhattacharjee, S. K.Samanta, P. Moitra, **K. Pramoda**, R. Kumar, S. Bhattacharya and C. N. R. Rao, *Chem. Eur. J.* 2015, *21*, 5467. Nanocomposite Made of an Oligo(*p*-phenylenevinylene) Based Trihybrid Thixotropic Metallo(organo)gel Comprising Nanoscale Metal–Organic Particles, Carbon Nanohorns and silver nanoparticles. **(IF:5.236)**
39. K. Gopalakrishnan, **K. Pramoda**, U. Maitra, U. Mahima, M. A. Shah and C. N. R.Rao, *Nanomaterials and Energy* 2014, *4*, 9. Performance of MoS<sub>2</sub>-reduced graphene oxide nanocomposites in supercapacitors and in oxygen reduction reaction.
40. K. Moses, **K. Pramoda** and C. N. R. Rao, *Nanomaterials and Energy* 2014, *4*, 3. Use of a borocarbonitride–iron phthalocyanine composite in ORR.
41. **K. Pramoda**, K. Moses, Mohd. Ikram, K. Vasu, A. Govindaraj and C. N. R. Rao, *J. Clust. Sci.* 2014, *25*, 173. Synthesis, characterization and properties of single-walled carbon nanohorns. **(IF:1.302)**
42. K. Vasu, **K. Pramoda**, K. Moses A. Govindaraj and C N R Rao, *Mater. Res. Exp.* 2014, *1*, 15001. Single-walled nanohorns and other nanocarbons generated by submerged arc discharge between carbon electrodes in liquid argon and other media. (IF:1.618)
43. N. Kumar, K. Moses, **K. Pramoda**, S. N. Shirodkar, A. K. Mishra, U. V. Waghmare, Sundaresan and C. N. R. Rao, *J. Mater. Chem. A* 2013, *1*, 5806. Borocarbonitrides, BxCyNz. **(IF:14.6)**
44. **K. Pramoda**, S. Suresh, H. S. S. R. Matte and A. Govindaraj, *Bull. Mater. Sci.* 2013, *36*, 585. Graphene composites containing chemically bonded metal oxides. **(IF:1.392)**
45. H. S. S. R. Matte, U. Maitra, P. Kumar, B. G. Rao, **K. Pramoda** and C. N. R. Rao, *Z. Anorg. Allg. Chem.* 2012, *15*, 2617. Synthesis, Characterization, and Properties of Few-layer Metal Dichalcogenides and their Nanocomposites with Noble Metal Particles, Polyaniline, and Reduced Graphene Oxide. **(IF:1.493)**

### Current Projects

1. Awarded SERB start-up grant (Grant No: SRG/2022/000988) amount of 3235716 in the financial year 2022-2023.
2. Awarded Rs. 30 lakhs financial grant by VGST, Govt. of Karnataka in the financial year 2023-2024 (GRD No:1010) under CISEE scheme.



