

Dr. Pradip Kr. Sukul

Degree: Ph.D.

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About Dr. Sukul:

Education:

Dr. Sukul is an Assistant Professor (Senior Grade and DST INSPIRE Faculty Fellow) at the Department of Chemistry, Amity University Kolkata since October 2018. Dr. Sukul received his PhD (**PhD Thesis Title:** "Synthesis, Characterization and Gelation Studies of Perylene Derivatives") in Chemistry from the Indian Association for the Cultivation of Science (IACS)/Jadavpur University, India in December 2013 under the supervision of Prof. Sudip Malik, School of Interdisciplinary Sciences, IACS. His M.Sc. in Chemistry with Organic Chemistry Specialization from Vidyasagar University, India in July 2008 and his B.Sc. in Chemistry from Mahishadal Raj College (Vidyasagar University), India in 2006.

Professional Experience:

He did his Postdoctoral Research work with [Prof. Omar M. Yaghi and Dr. Kentaro Tashiro](#), Reticular Materials Group, International Centre for Materials and Nanoarchitectonics, National Institute for Materials Science, Japan from February 2014 to December 2015. Before joining at Amity University Kolkata he worked as a [DST Inspire Faculty](#), Department of Chemistry, National Institute of Technology Patna, India from June, 2016 to October, 2018.

Research Areas:

His research fields of interest include Metal Peptide Chemistry, Supramolecular Chemistry, Materials Chemistry, Bioinspired Materials for Electronics, Sensing and Energy.



PUBLICATIONS

Total Publications: 21, Average Impact Factor = 4.63, h index = 12

21. S. Dey and [Pradip K. Sukul*](#), “Selective Detection of Pyrophosphate Anions in Aqueous Medium Using Aggregation of Perylene Diimide as a Fluorescent Probe”, *ACS OMEGA*, 2019, 14, 4, 16191-16200.
20. S. Das, R. Banik, B. Kumar, S. Roy, Noorussabah, K. Amhad and [Pradip K. Sukul*](#), “A Green Approach for Organic Transformations Using Microwave Reactor”, *Current Organic Synthesis*, 2019, 16, 5, 730-764.
19. [Pradip K. Sukul](#) and S. Malik, “Co(II) Induced Aggregation of Chiral Perylene Derivatives and Macroscopically Formation of Supramolecular Networks”, *Chem. Lett.*, 2018, 47, 4, 576.
18. P. Bose, [Pradip K. Sukul](#), O. M. Yaghi and K. Tashiro, “Synthesis of Water Soluble Metal Organic Complex Array”, *J. Vis. Expt.*, 2016, doi:10.3791/54513.
17. K. Bag, [Pradip K. Sukul](#), D. C. Santra, A. Roy and S. Malik, “Proton induced aggregation of water soluble isophthalic acid appended arylene diimides: justification with perylene derivative”, *RSC Advances*, 2016, 6, 34027 (SCI, I.F.: 3.84).
16. D. C. Santra, M. K. Bera, [Pradip K. Sukul](#) and S. Malik, “Charge-Transfer-Induced Fluorescence Quenching of Anthracene Derivatives and Selective Detection of Picric Acid”, *Chem. Eur. J.*, 2016, 20, 1 (SCI, I.F.: 5.731).
15. [Pradip K. Sukul](#), P. Bose, T. Takei, O. M. Yaghi, Y. He, M. Lee and K. Tashiro, “A water-soluble metal–organic complex array as a multinuclear heterometallic peptide amphiphile that shows unconventional anion dependency in its self-assembly”, *Chem. Commun.*, 2016, 52, 1579 (SCI, I.F.: 6.834).
14. R. S. Jacob, D. Ghosh, P. K. Singh, S. K. Basu, N. N. Jha, S. Das, [Pradip K. Sukul](#), S. Patil, S. Sathaye, A. Kumar, A. Chowdhury, S. Malik, S. Sen and S. K. Maji, “Self Healing Hydrogels Composed of Amyloid Nano Fibrils for Cell Culture and Stem Cell Differentiation”, *Biomaterials*, 2015, 54, 97 (SCI, I.F.: 8.911).
13. [Pradip K. Sukul](#), P. K. Singh, S. K. Maji and Sudip Malik, “Water Soluble Perylene Bisimide and Its Turn Off/On Fluorescence are Used to Detect Cysteine and Homocysteine”, *New Journal of Chemistry*, 2015, 39, 5084 (SCI, I.F.: 3.277).
12. U. Rana, S. Mondal, J. Sannigrahi, [Pradip K. Sukul](#), Md. A. Amin, S. Majumdar and S. Malik, “Aromatic bi-, tri- and tetracarboxylic Acid Doped Polyaniline Nanotubes: Effect on Morphologies and Electrical Transport Properties”, *Journal of Materials Chemistry C*, 2014, 2, 3382 (SCI, I.F.: 5.066).

11. A. Jana, [Pradip K. Sukul](#), S. K. Mandal, S. Konar, S. Ray, K. Das, J. A. Golen, A. L. Rheingold, S. Mondal, T. K. Mondal, A. R. Khuda-Bkshsh and S. K. Kar, "A Novel 2,6-diformyl-4-methyl Phenol Based Chemosensor for Zn(II) Ion by Ratiometric Displacement of Cd(II) Ion and its Application for Cell Imaging on Human Melanoma Cancer Cells", *Analyst*, 2014, 139, 495 (SCI, I.F.: 4.107).
10. T. Ghosh, J. Adhikary, P. Chakraborty, [Pradip K. Sukul](#), M. S. Jana, T. K. Mondal, E. Zangrando and D. Das, "Radical Pathway in Catecholase Activity with Nickel (II) Complexes of Phenol Based "end-off" Compartmental Ligands", *Dalton Trans.*, 2014, 43, 841 (SCI, I.F.: 4.197).
09. [Pradip K. Sukul](#), Ayan Dutta and S. Malik, "Light Harvesting and Amplification of Emission of Donor Perylene and Acceptor Perylene Aggregates in Aqueous Medium", *Chem. Eur. J.*, 2014, 20, 3019 (SCI, I.F.: 5.731).
08. A. Jana, [Pradip K. Sukul](#) and A. Dhara, "Design and Hydrothermal Synthesis of an Unprecedented Luminescent (7,7) Connected Binodal Potassium-Pyrazolate Coordination Framework", *Journal of The Indian Chemical Society*, 2014, 91, 1661 (SCI, I.F.:xx).
07. S. Sengupta, S. Ganguly, A. Goswami, [Pradip K. Sukul](#) and R. Mondal, "Identification of a Robust and Reproducible Noncluster-type SBU: Effect of Coexistent Groups on Network Topologies, Helicity and Properties", *CrystEngComm*, 2013, 15, 8353 (SCI, I.F.: 4.034).
06. C. Chakraborty, [Pradip K. Sukul](#), K. Dana and S. Malik, "Suppression of Keto Defects and Thermal Stabilities of Polyfluorene-Kaolinite Clay Nanocomposites", *Ind. Eng. Chem. Res.*, 2013, 52, 6722 (SCI, I.F.: 2.587).
05. [Pradip K. Sukul](#) and S. Malik, "Removal of Toxic Dyes from Aqueous Medium Using Adenine Based Bicomponent Hydrogel", *RSC Advances*, 2013, 3, 1902 (SCI, I.F.: 3.84).
04. [Pradip K. Sukul](#), P. K. Singh, S. K. Maji and S. Malik, "Aggregation Induced Chirality in a Self Assembled Perylene Based Hydrogel: Application of the Intracellular pH Measurement", *Journal of Materials Chemistry B*, 2013, 1, 153. (**Front Cover Page**) (SCI, I.F.: 4.726).
03. D. Asthana, A. Kumar, A. Pathak, [Pradip K. Sukul](#), S. Malik, R. Chatterjee, S. Patnaik, K. Rissanene and P. Mukhopadhyay, "An All-Organic Steroid-D- π -A Modular Design Drives Ferroelectricity in Supramolecular Solids and Nano-Architectures at RT", *Chem. Commun.*, 2011, 47, 8928 (SCI, I.F.: 6.834).
02. [Pradip K. Sukul](#) and S. Malik, "Supramolecular Hydrogels of Adenine: Morphological, Structural and Rheological Investigations", *Soft Matter*, 2011, 7, 4234 (SCI, I.F.: 4.029).
01. [Pradip K. Sukul](#), D. Asthana, P. Mukhopadhyay, D. Summa, L. Muccioli, C. Zannoni, D. Beljonne, A. E. Rowan and S. Malik, "Assemblies of perylene diimide derivatives with melamine into

luminescent hydrogels”, *Chem. Commun.*, 2011, 47, 11858. (**First among top ten most accessed article**) (SCI, I.F.: 6.834).

PATENT FILED

1. **Inventor:** Pradip K. Sukul, A. Mondal and S. Das.
Organisation: **National Institute of Technology Patna**, India.
Title: Superhydrophobic Photostable Dye Coated Magnetic Nano Materials For Separating Contaminated Oil.
Patent no.: Indian Patent, **2017**, 201731030661, Filed.
2. **Inventor:** Pradip K. Sukul and K. Tashiro.
Organization: **National Institute for Materials Science, Japan**.
Title: Inhibitor suppresses formation of amyloid fibrils, degrades amyloid fibrils decomposing agent, prevention of neurodegenerative diseases, medicaments for the treatment and / or inhibiting the progression, as well as the manufacturing method of inhibitors and degradation agents.
Patent No.: International Patent, **2015**, Japan 2015023490, Filed.

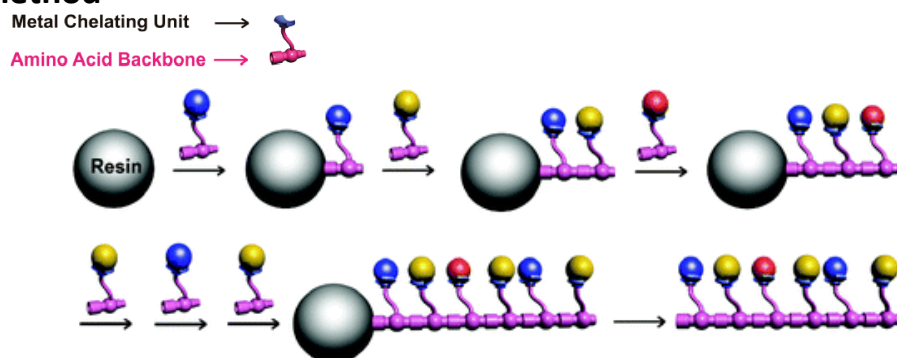
List of Awards:

S. No.	Name of Award	Awarding Agency	Year
1.	DST INSPIRE Faculty Award	DST, Govt. of India	2016
2.	Dr. D S Kothari Post Doctoral Fellowship with with Prof. G. Muges, IPC Department, IISC Bangalore	UGC, INDIA	2015
3.	WPI-MANA Post Doctoral Fellowship (JAPAN) with Prof. Omar M. Yaghi and Dr. K. Tashiro, Reticular Materials Group, MANA, NIMS	NIMS, Japan	2014
4.	FQRNT International Post Doctoral Fellowship, Canada	Quebec granting agency, Canada	2014
5.	CSIR-Senior Research Fellowship	CSIR, Govt. of India	2010
6.	CSIR-Junior Research Fellowship	CSIR, Govt. of India	2008
7.	International Travel Award	DST, Govt. of India	2011

8.	Best Poster Award in 11 th International conference on Frontiers of Polymers and Advanced Materials (MACRO-2010)	MACRO & IIT Delhi, India	2010
9.	Best poster Award in Recent Advances in Rubber & Polymer Science & Technology, RAPT-2014	RAPT & Calcutta University, India	2014
10.	Young Scientist Award in Proceedings of the Acharya Prafulla Chandra Ray Memorial Symposium on Chemistry & Industry (2012)	Indian Chemical Society	2012
11.	Selected for Oral Presentations in “Young Scientist Colloquium-2012 (MRSI, Kolkata Chapter, CSIR-CGCRI)	MRSI, Kolkata Chapter	2012
12.	Selected for Oral Presentations in 3 rd FAPS Polymer Congress and MACRO-2013	MACRO & IISC Bangalore	2013
13.	Accepted Cover Page in Journal (International)	J. Mater. Chem. B. (Royal Society of Chemistry, UK)	2013
14.	CRSI life member	CRSI, India	2017
15.	MRSI life member	MRSI, India	2017
16.	ISSST life member	ISSST Kolkata	2019

Experiences in Research during Post Doctoral Study (NIMS, JAPAN)

1) Multinuclear Heterometallic Peptide Complexes (MHC) via SPPS method



a) Self Assembled Water Soluble Multinuclear Heterometallic Complexes and Their Interaction with DNA/RNA:

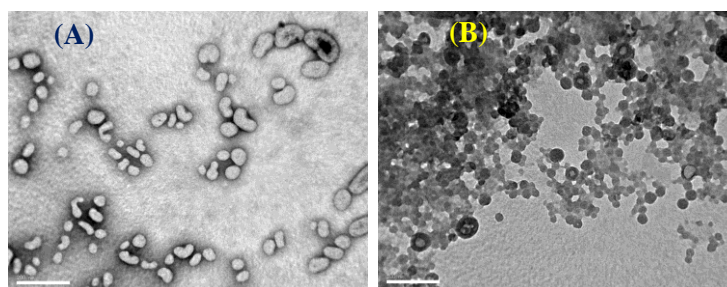
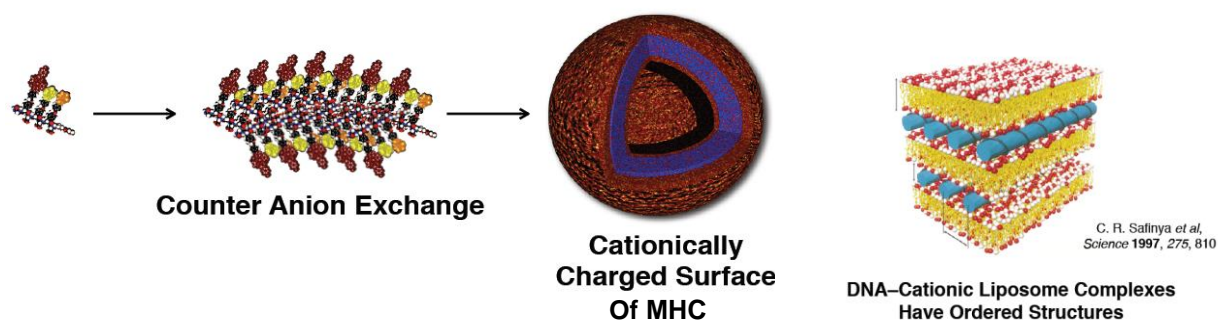


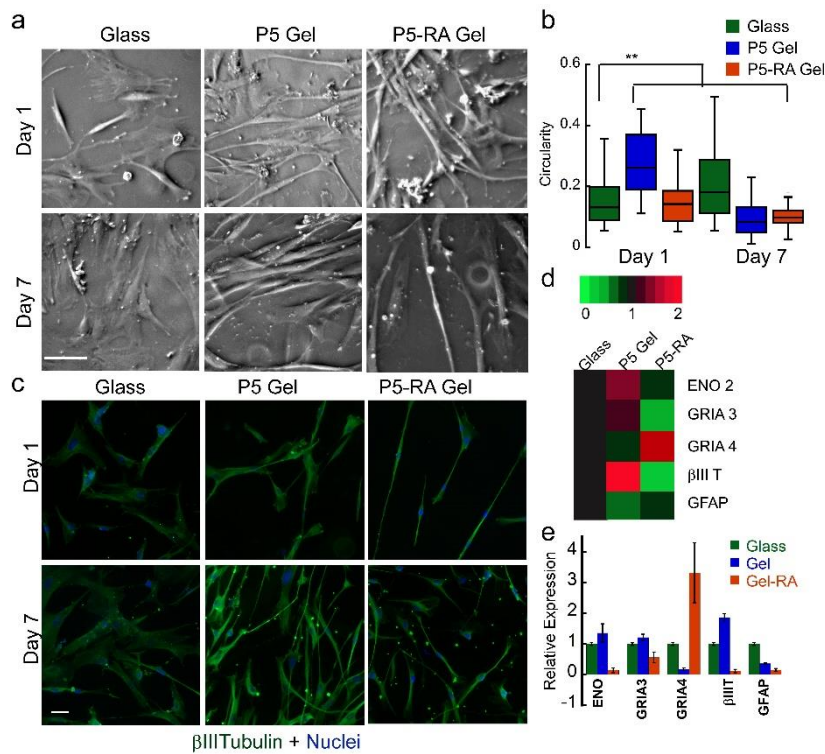
Figure: Vesicle Formed by Metallo-Peptide derivatives in different conditions.

Reference: *Sukul et. al., Chem Commun. 2016, 52, 1579-1581.*

Title: Inhibitor suppresses formation of amyloid fibrils, degrades amyloid fibrils decomposing agent, prevention of neurodegenerative diseases, medicaments for the treatment and / or inhibiting the progression, as well as the manufacturing method of inhibitors and degradation agents
Patent No.: Japan 2015023490.

II) *Manuscript Ready for Submission.*

3) Self healing hydrogels composed of amyloid nano fibrils for cell culture and stem cell differentiation

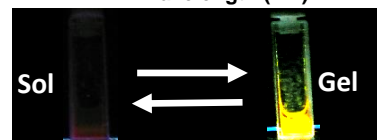
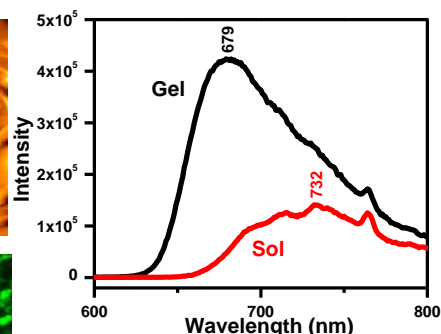
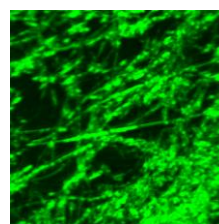
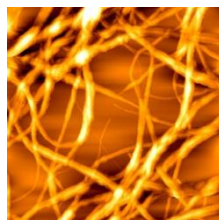
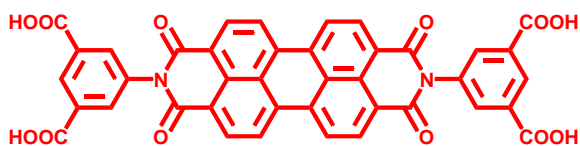


Amyloids are highly ordered protein/peptide aggregates associated with human diseases as well as various native biological functions. Given the diverse range of physiochemical properties of amyloids, we hypothesized that higher order amyloid self-assembly could be used for fabricating novel hydrogels for biomaterial applications. The stiffness of these gels are tunable by varying peptide/salt concentrations and able to support the attachment and spreading of diverse range of cell types, and in driving neuronal differentiation of mesenchymal stem cells. Taken together, our results showed the diverse applicability of amyloid-based hydrogels for biomaterial/nanotechnological applications.

Reference: *Biomaterials*, 2015, 54, 97-105.

Experiences in Research during PhD (IACS, KOLKATA)

Project-1: Luminescent bicomponent hydrogel



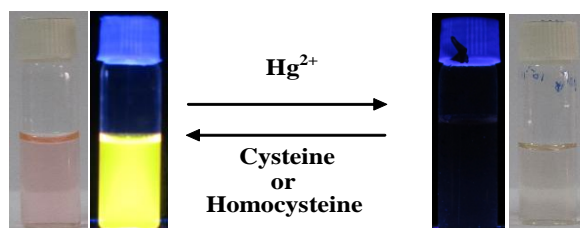
Utilizing supramolecular weak interactions (hydrogen bonding and π - π stacking) as a tool to form three dimensional networks, we have designed new type of water soluble perylene bisimide which form hydrogel upon addition of

melamine to the aqueous solution. The produced hydrogel showed bright yellow fluorescence whereas solution showed no fluorescence. Large blue shifting with increase in intensity occurs in the gel indicating the formation of H-type aggregation of the excitons which is rare. The individual fibers in the dried gel also showed bright fluorescence look application in the bio-sensor materials.

Reference: *Chem. Commun.*, 2011, 47, 11858-11860.

Project-2: Supramolecular sensor for cysteine/homocysteine in aqueous medium

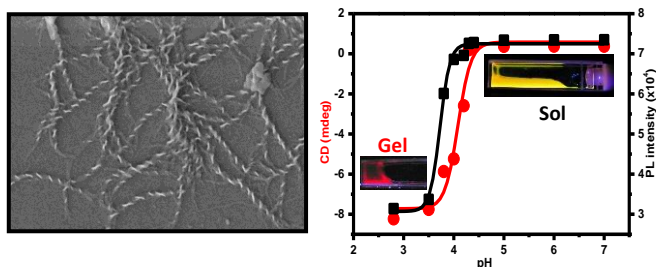
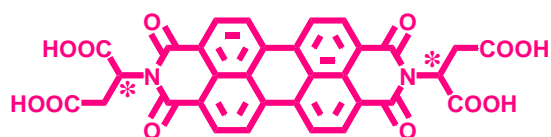
Our previous work with the melamine induced specific H type aggregation of perylene derivative was encouraging as the self assembled system showed strong luminescence. To turn off the



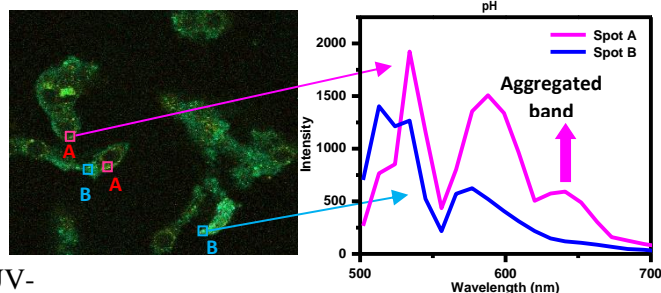
fluorescence of this system, we have searched a specific metal ion. Among all the tested bivalent metal ions, only Hg²⁺ is a specific and excellent quencher. Perylene-melamine hydrogen bonded network when complex with Hg²⁺ produced a chemosensing ensemble probe. This probe is highly sensitive towards homocysteine (small to cysteine) among all other amino acids. We have applied the probe to detect quantitatively the amount of homocysteine and cysteine in human urine and blood plasma.

Reference: *New Journal of Chemistry*, 2015, 39, 5084-5087.

Project-3: Stimuli responsive aggregation of water soluble perylene bisimide towards application of intracellular pH measurement



We have design in a very nice way amino acid substituted perylene derivatives which form hydrogel upon lowering the pH of the medium. This system exhibits induction of chirality during aggregation which shows helical bias in CD spectra with zero crossing near to the λ_{\max} of UV-



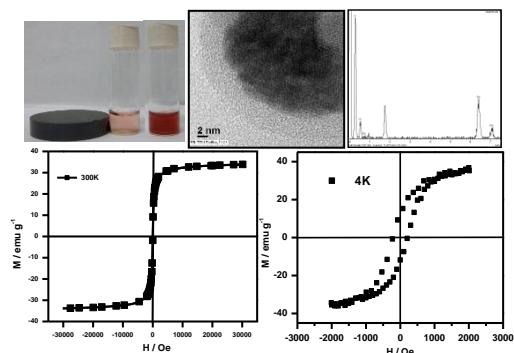
Vis spectra. Fluorescence spectra indicate the formation of a new band at higher wavelength due to aggregation. We have applied this concept of pH dependent fluorescence change from *in vitro* to *in vivo*. Successfully this non toxic system can measure the intracellular pH.

Reference: 1. *J. Mater. Chem. B*, **2013**, 1, 153-156..... (Front cover page)

2. *Chem. Eur. J.*, **2014**, 20, 3019-3022.

Project-4: Core-shell super paramagnetic nano particle for the MRI agent

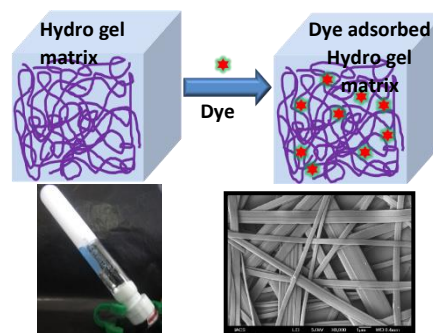
We have prepared core-shell super paramagnetic nano particle in which shell was consist of perylene bisimide ligand. Due to presence of hydrophilic groups outward the shell, these particles are highly water dispersible. These nano particles showed super paramagnetic behavior at room temperature. The mean blocking temperature (T_B) for this particle was 140 K. We have potentially applied these materials for MRI imaging purpose in collaboration with Medical Doctors.



Reference: *Manuscript under preparation*.

Project-5: Hydrogel of vitamine B₄

Taking the advantages of the hydrogen bonding donor and acceptor capability of adenine, we have design several tricarboxylic acid to produce hydrogel. It is important to presence of symmetry of the hydrogen bonding sites (C₃) between adenine and tricarboxylic acids. These hydrogel looks application in tissue engineering. We have synthesized long π -conjugated tricarboxylic acid which form hydrogel and applied to remove toxic dye from waste water.



Reference: 1. *Soft Matter*, **2011**, 7, 4234-4241.

2. *RSC Adv.*, **2013**, 3, 1902-1915.