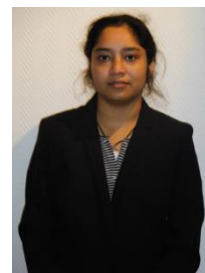


## Curriculum Vitae

### Dr. Poulami Jana

Assistant Professor  
Dept-Chemistry  
Kaliachak College  
Sultanganj, Malda  
Date of joining: 23.09.2020  
**E-Mail:**poulamijana123@gmail.com



#### Biographical Data

Date of Birth: 1<sup>st</sup> July, 1986  
Marital Status: Married  
Nationality: Indian

### Academic Qualifications

- 2009-2012:** Ph. D. Doctoral research in the area of “**Molecular self-assembly of synthetic peptides: Structure and Function**” under supervision of **Dr. Debasish Haldar** in the Department of Chemical Science, Indian Institute of Science Education and Research-Kolkata, Mohanpur, Nadia-741252, West Bengal, India.
- 2006-2008:** Received M. Sc. (Master of Science) Degree in Chemistry (Organic Major) with First Class (75% marks) from Vidyasagar University, Midnapore, West Bengal, India.
- 2003-2006:** Received B. Sc. (Honors) Degree in Chemistry with 2nd Class (59.75% marks) from Vidyasagar University, Midnapore, West Bengal, India.

#### Details of Educational Qualification

Exam. Passed	Specialization	Board/University	Passing Year	Class/ Division	% marks/ CGPA
10 <sup>th</sup> standard	Life science, Physical Science, Geography, History, English, Bengali.	West Bengal Board of Secondary Education	2001	1st	79.87 %
12 <sup>th</sup> standard	Physics, Chemistry, Mathematics, Biology	West Bengal Council of Higher Secondary Education	2003	1st	73.1 %
Bachelor's Degree	Organic, Inorganic and Physical chemistry	Midnapore college, Vidyasagar University	2006	2nd	59.75 %
Master's Degree	Organic Chemistry	Vidyasagar University	2008	1st	75.2 %

Ph.D.	Organic Supramolecular chemistry	IISER-KOLKATA	5.9.2012		
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### Research Experience

- October 2017-September 2020: DST-Inspire Faculty at Visva-Bharati, Shantiniketan.**  
**Field of research:** Design synthesis and characterisation of peptidic foldamer for gene delivery.
- March 2014-September 2017: Alexander von Humboldt Postdoctoral** research fellow, Institute of Organic Chemistry, University of Duisburg-Essen, Germany. Advisor: **Prof. Dr. Carsten Schmuck.**  
**Field of research:** Design, synthesis and characterization of hybrid amphiphilic peptide for gene delivery: study their structure-function relation.
- 2013-2014: Dr. D. S. Kothari** Postdoctoral Research Fellow, Department of Molecular Biophysics Unit, Indian Institute of Science, Bangalore, India. Advisor: **Prof. Dr. Padmanabhan Balaram.**  
**Field of research:** Design of folded peptide structures from homo and hetero oligomers of  $\alpha$ ,  $\beta$  and  $\gamma$  amino acids.

### Teaching Experience

From October 2017-September 2020 I was engaged to teach students (organic chemistry) both theory and practical of 5 years Integrated M.Sc. course at Visva-Bharati-Santiniketan in the dept. of ISERC-Siksha Bhavana.

Since 23.09.2020, I engage in teaching (both theory and practical) Chemistry of B.Sc. students at Kaliachak College in the department of Chemistry.

### Fellowships and Awards

- 2017:** DST-Inspire faculty award, India.
- 2014:** Alexander von Humboldt Postdoctoral fellowship, Germany.
- 2013:** Dr. D. S. Kothari Postdoctoral Fellowship, India.
- 2008:** Qualified the Joint CSIR-UGC National Eligibility Test.

### Research achievements

Title of Thesis: My Ph.D. thesis entitled "MOLECULAR SELF-ASSEMBLY OF SYNTHETIC PEPTIDES: STRUCTURE AND FUNCTION" represents the synthesis, characterization, conformational analyses and self-association study of designed peptides using natural / or non-natural amino acids. The following subtopics were developed during my Ph.D. work.

#### Porous material from short peptides and their application:

Synthesis and x-ray crystallographic study of short peptides that self assembles into nano-porous materials by using various non-covalent interactions such as hydrogen bonds, hydrophobic interaction,  $\pi$ - $\pi$  stacking interaction etc. These porous peptides can adsorb gas, remove organic dyes from waste

water or can encapsulate and release drug at neutral condition. Ref. *CrystEngComm.*, **2011**, 13, 973-978; *CrystEngComm.*, **2011**, 13, 3064-3071; *Soft Matter*, **2011**, 7, 10174-10181; *Crystal Growth and Design*, **2012**, 12, 422-428; *Org. Lett.* **2014**, 16, 38-41.

#### **Supramolecular double helix from short peptides and their application:**

Demonstrate the formation of double helical mimic structure from synthetic short peptides containing conformationally restricted Aib ( $\alpha$ -aminoisobutyric acid) residues at the central position by using x-ray crystallographic study. These peptides can adsorb  $N_2$  gas in their double helical hollow. Also we used capped  $\gamma$ -peptide to build helical structure and these peptides interact with sulfamethoxazole a potent bacteriostatic antibiotic. Ref. *Chem. Commun.*, **2011**, 47, 2092-2094; *Chem. Commun.*, **2012**, 48, 711-713.

#### **Molecular recognition of amino acid and anion by using bisimide compound:**

Synthesis, x-ray crystal structure and self-assembly study of L-amino acid containing bisimide compounds, these electron poor bisimide compounds can be used as amino acid recognition or anion detection based on the donor acceptor interaction. Ref. *CrystEngComm.*, **2012**, 14, 6586-6592; *CrystEngComm.*, **2013**, 15, 2512-2518.

#### **Peptide metal interaction:**

Synthesis and x-ray crystallographic study of short peptides structure. These peptides self-assembled into fiber or tape like structures where they can bind metal nanoparticle and further tune their optoelectronic properties. Ref. *CrystEngComm.*, **2012**, 14, 3156-3162; *CrystEngComm.*, **2012**, 14, 4034-4040; *Soft Matter*, **2012**, 8, 7960-7966.

#### **Stimuli responsive nanostructure and gel formation:**

Synthesis of short peptide enriched with aromatic amino acid that formed organogel and charged transfer complex with picric acid under UV-light. Ref. *Soft Matter*, **2012**, 8, 5621-5628.

#### **Self-assembly of peptide into hierarchical structure:**

In this subtopic we have synthesized short peptides and peptide based Naphthalene-Bisimides compounds and study their mechanistic pathway of sphere to rod like structure as well as fiber formation. Ref. *Langmuir*, **2011**, 27, 3835-3841; *Cryst. Growth Des.* **2014**, 14, 3918-3922.

#### **Inhibition of amyloid fiber formation:**

Inhibition of amyloid fiber formation of hen egg lysozyme protein was studied by using small synthetic molecule (2-acetyl amino-3-[4-(2-amino-5-sulfo-phenylazo)-phenyl]-propionic acid). Ref. *Med. Chem. Commun.*, **2013**, 4, 530-536; *Cryst. Growth Des.* **2014**, 14, 1032-1038.

Postdoctoral work title: a) **Design of folded peptide structures from homo and hetero oligomer of  $\alpha$ ,  $\beta$  and  $\gamma$  amino acids.** Synthesis of conformationally constrained  $\beta$  and  $\gamma$  amino acid through homologation of  $\alpha$ -amino acid. By using  $\alpha$ ,  $\beta$  and  $\gamma$  amino acid I have synthesized hybrid peptide sequences and further studied their conformation by using FTIR and NMR spectra analysis.

#### **b) i) Design of Guanidiniocarbonyl pyrrole functionalized amphiphilic dendrimer for gene delivery**

Guanidiniocarbonyl pyrrole (GCP) conjugated PAMAM-G2 dendrimer, a highly efficient vector for gene delivery. In this work we have synthesized GCP conjugated PAMAM-G2 dendrimer which can bind plasmid DNA and deliver into cell and act as a vector for gene delivery.

Ref. *Chem. Commun.*, **2016**, 52, 12446-12449.

ii) **The importance of tailor made synthetic building blocks Guanidiniocarbonyl pyrrole unit for secondary structure formation.**

A seven residue amphiphilic peptide composed of hydrophilic guanidiniocarbonyl pyrrole at lysine side chain and cyclohexylalanine as a hydrophobic residue formed a stable  $\beta$ -Sheet and amyloid-like fibers at neutral condition whereas at acidic condition it formed random and vesicle like structure.

Ref. *Angew. Chem. Int. Ed.* **2016**, 55, 15287-15291.

iii) **Efficient Gene Transfection through Inhibition of  $\beta$ -Sheet (Amyloid Fiber) Formation of a Short Amphiphilic Peptide by Gold Nanoparticles**

The effect of citrate-stabilized gold nanoparticles (AuNPs) on the secondary structure of an artificial  $\beta$ -sheet forming cationic peptide has been studied. The AuNPs inhibited  $\beta$ -sheet formation and led to fragmented fibrils and spherical oligomers with assembled AuNPs on their surface. Besides this structural change, the functional properties of the peptide are also different. Whereas the peptide was unable to act as a vector for gene delivery, formation of a complex with AuNPs allowed successful gene delivery into cells.

Ref. *Angew. Chem. Int. Ed.* **2017**, 56, 8083-8088.

iii) **Self-assembly in polar solution**

We have developed the novel tripodal triszwiterion, derived from a C3-symmetric benzene- 1,3,5-tricarboxamide (BTA) core, which forms a thermo-reversible and pH-switchable transparent hydrogel through intermolecular self-complementary zwitterionic interactions at a neutral pH value.

Ref. *Chemistry A European Journal*, **2017**, 23, 320 – 326.

iv) **Impact of peptides sequences on their structure and function: Mimicking of Virus-like Nanoparticles for Gene Delivery (both DNA and siRNA). Manuscript submitted.**

## Future Research Interests

I am interested in focus my future research work in the field of **bio-organic supramolecular chemistry at the interface of chemical biology and nanomaterial science**. Supramolecular chemistry is a multidisciplinary field which impinges on various other disciplines such as the traditional areas of organic and inorganic chemistry, needed to synthesise the precursors for a supermolecule, physical chemistry to understand the properties of supramolecular systems and computational modelling to understand complex supramolecular behaviour and finally the X-ray crystallography to assign details of interactions of macromolecules. Supramolecular chemistry deals with the weaker and reversible non-covalent interactions such as (hydrogen bonding, metal coordination, hydrophobic forces, Van der Waals forces,  $\pi$ - $\pi$  interactions and electrostatic effects) between molecules into a well-defined aggregated structure in a manner of definite shape and size. Important concepts or examples that have been demonstrated by supramolecular chemistry include molecular self-assembly, peptide folding, molecular recognition, host-guest chemistry, template-directed synthesis, mechanically-interlocked molecular architectures, molecular machines and molecular imprinting techniques, formation of molecular crystal, crystal growth and their solid state packing .

Exploiting supramolecular approach, the followings subtopics I would like to focus such as

1. Conformational analysis of small peptides composed with proteinous and non-proteinous amino acid by using x-ray crystallography.
2. Design, synthesis and characterization of hybrid amphiphilic peptidic foldamer for gene delivery: study their structure-function relation, peptide-DNA complex formation.
3. Peptide nanomaterial surface interactions towards the formation of multimaterial nanoparticle via bionanocombinatoric strategy: Pathway to understand the structure-property relationships of peptide-material interface.
4. Beta-sheet enriched Amyloid fiber formation from short peptides: study their aggregation-disaggregation behaviour with the use of small synthetic molecules.
5. Polymerisation of small organic compounds composed with synthetic building block in an aqueous medium: study their stimuli responsive and chirality behaviour.

### Teaching Interests

I would like to teach general chemistry, mainly organic chemistry for both under and postgraduate students as part of my academic career. It is nice opportunity to share my knowledge with students. I would enjoy the opportunity to teach organic chemistry. I am also interested in teaching the practical course. During my Ph.D. and postdoctoral study, I got an opportunity to train master and newly joined Ph.D. student. I found the experience enjoyable and gratifying. I would like to teach the following topics.

Chemistry courses

Course 1: Organic Reaction, Mechanism and Stereochemistry

Course 2: Synthetic Organic Chemistry

Course 3: Photochemistry and Pericyclic Reactions

Course 4: Heterocyclic Chemistry

Course 5: Supramolecular Chemistry

Course 6: Bio-organic chemistry and chemical biology (amino acids, peptides, proteins, enzymes, carbohydrates, nucleic acids and lipids etc.).

### Instrumental Skills and Techniques

I have developed my strong research skills during my doctoral studies by day-to-day laboratory work in the department of Chemistry at IISER-KOLKATA, India. I have more than 8 years research experienced including my Ph. D. and postdoctoral research career. In this time period, I have expertised in various research field such as synthesizing of various organic compounds in multistep reaction, peptide chemistry, molecular self-assembly to supramolecular polymers and nonviral vector for gene delivery using various cell line. Beside this synthetic skill, I am also able to handle various scientific instrument such as Single crystal X-ray diffraction study, 2D-NMR (ROESY, COSY), UV/VIS and FT-IR spectroscopy; Morphological study of the peptides in the solid state by SEM, TEM, and optical microscope, handling TGA/DSC, AFM, Jeol NMR instrument, Isothermal titration calorimetry (ITC), Medium pressure liquid chromatography (MPLC), High-pressure liquid chromatography (HPLC) etc. The knowledge of interpretation of spectroscopic data viz FT-IR, Mass,  $^1\text{H}$  NMR,  $^{13}\text{C}$  NMR,  $^1\text{H}$ - $^1\text{H}$  COSY, HMQC, HMBC, HSQC spectra.

### List of Publications (Refereed International Journals)

#### A) List of published papers

1. **Jana, P.;** Samanta, K.; Bäcker, S.; Zellermann, E.; Knauer, S.; Schmuck, C. (2017): Efficient Gene Transfection through Inhibition of  $\beta$ -Sheet (Amyloid Fiber) Formation of a Short Amphiphilic Peptide by Gold Nanoparticles. *Angew. Chem. Int. Ed.* **2017**, 56, 8083-8088. [I.F. = **11.994**].
2. **Jana, P.;** Schmuck, C. (2017): Self-assembly of a tripodal triszwitterion forms a pH-switchable hydrogel which can reversibly encapsulate hydrophobic guests in water. *Chemistry A European Journal*, **2017**, 23, 320 – 326. [I.F. = **5.77**].
3. **Jana, P.;** Ehlers, M.; Zellermann, E.; Samanta, K.; Schmuck, C. (2016): pH-Controlled Formation of a Stable  $\beta$ -Sheet and Amyloid-like Fibers from an Amphiphilic Peptide: The Importance of a Tailor-Made Binding Motif for Secondary Structure Formation. *Angew. Chem. Int. Ed.* **2016**, 55, 15287-15291. [I.F. = **11.994**].
4. Samanta, K.; **Jana, P.;** Bäcker, S.; Knauer, S.; Schmuck, C. (2016): Guanidiniocarbonyl pyrrole (GCP) conjugated PAMAM-G2, a highly efficient vector for gene delivery: the importance of DNA condensation. *Chem. Commun.*, **2016**, 52, 12446-12449. [I.F. = **6.31**].
5. **Jana, P.;** Bera, S.; Paikar, A.; Haldar, D. (2014): Terminal Peptide Directed Assembly of Naphthalene-Bisimides. *Cryst. Growth Des.* **2014**, 14, 3918–3922. [I.F. = **4.05**].
6. **Jana, P.;** Paikar, A.; Bera, S.; Maity, S. K.; Haldar, D. (2014): Porous Organic Material from Discotic Tricarboxamide: Side Chain– Core interactions. *Org. Lett.* **2014**, 16, 38–41. [I.F. = **6.579**].
7. Bera, S.; **Jana, P.;** Maity, S. K.; Haldar, D. (2014): Inhibition of Fibril Formation by Tyrosine Modification of Diphenylalanine: Crystallographic Insights. *Cryst. Growth Des.* **2014**, 14, 1032–1038. [I.F. = **4.05**].
8. **Jana, P.;** Maity, S. K.; Bera, S.; Ghorai, P. K.; Haldar, D. (2013): Hierarchical self-assembly of naphthalene bisimides to fluorescent microspheres and fluoride sensing. *CrystEngComm.*, **2013**, 15, 2512–2518. [I.F. = **3.474**].
9. Maity, S.; Kumar, R.; Maity, S. K.; **Jana, P.;** Bera, S.; Haldar, D. (2013): Synthesis and study of 2-acetyl amino-3-[4-(2-amino-5-sulfo-phenylazo-phenyl)]-propionic acid: a new class of inhibitor for hen egg white lysozyme amyloidogenesis. *Med. Chem. Commun.*, **2013**, 4, 530-536. [I.F. = **2.495**].
10. **Jana, P.;** Maity, S.; Haldar, D. (2013): Advances in the Synthesis of Organometallic Amino Acids and Analogues, *Advances in Organic Synthesis*, **2013**, Vol. 5, 355-357. [I.F. = **0.86**].
11. **Jana, P.;** Maity, S.; Maity, S. K.; Ghorai, P. K.; Haldar, D. (2012): Insights into H-aggregates and CH $\cdots$ O hydrogen bonds mediated self-assembly of pyromellitic bisimide. *CrystEngComm.*, **2012**, 14, 6586-6592. [I.F. = **3.474**].
12. **Jana, P.;** Maity, S.; Maity, S. K.; Ghorai, P. K.; Haldar, D. (2012): Photo-induced charge- transfer complex formation and organogelation by a tripeptide. *Soft Matter*, **2012**, 8, 5621-5628. [I.F. = **4.029**].
13. Maity, S.; Sarkar, S.; **Jana, P.;** Maity, S. K.; Bera, S.; Mahalingam, V.; Haldar, D. (2012): Sonication-responsive organogelation of a tripodal peptide and optical properties of embedded Tm $^{3+}$  nanoclusters. *Soft Matter*, **2012**, 8, 7960-7966. [I.F. = **4.029**].
14. Maity, S. K.; Maity, S.; **Jana, P.;** Haldar, D. (2012): Luminescent nanoparticles from tripeptide-CDS conjugate. *CrystEngComm.*, **2012**, 14, 4034-4040. [I.F. = **3.474**].
15. Maity, S. K.; Maity, S.; **Jana, P.;** Haldar, D. (2012): CdS quantum dots doped with a peptide matrix: structural and photoelectrochemical properties. *CrystEngComm.*, **2012**, 14, 3156- 3162. [I.F. = **3.474**].
16. Maity, S. K.; Maity, S.; **Jana, P.;** Haldar, D. (2012): Supramolecular double helix from capped  $\gamma$ -peptide. *Chem. Commun.*, **2012**, 48, 711-713. [I.F. = **6.31**].
17. Maity, S.; **Jana, P.;** Maity, S. K.; Haldar, D. (2012): Conformational heterogeneity, self-assembly, and gas adsorption studies of isomeric hybrid peptides. *Crystal Growth and Design*, **2012**, 12, 422-428. [I.F. = **4.05**].

18. Maity, S.; **Jana, P.**; Maity, S. K.; Haldar, D. (2011): Mesoporous vesicles from supramolecular helical peptide as drug carrier. *Soft Matter*, 2011, 7, 10174-10181. [I.F. = 4.02].
19. Maity, S.; **Jana, P.**; Haldar, D. (2011): Fabrication of nanoporous material from a hydrophobic peptide. *CrystEngComm*, 2011, 13, 3064-3071. [I.F. = 3.474].
20. Maity, S.; **Jana, P.**; Maity, S. K.; Haldar, D. (2011): Fabrication of hollow self-assembled peptide microvesicles and transition from sphere-to-rod structure. *Langmuir*, 2011, 27, 3835-3841. [I.F. = 3.833].
21. **Jana, P.**; Maity, S.; Maity, S. K.; Haldar, D. (2011): A new peptide motif in the formation of supramolecular double helices. *Chem. Commun.*, 2011, 47, 2092-2094. [I.F. = 6.31].
22. **Jana, P.**; Maity, S.; Haldar, D. (2011): Insights into self-assembling nanoporous peptide and *in situ* reducing agent. *CrystEngComm.*, 2011, 13, 973-978. [I.F. = 3.474].
23. **Jana, P.**; Maity, S.; Haldar, D. (2010): Developments in the synthesis of organometallic amino acids and analogues. *Current Organic Synthesis*, 2010, 7, 224-234. [I.F. = 2.05].

#### Manuscript under preparation

1. **Jana, P.**, Samanta, K., Bäcker, S., Zellermann, E., Knauer, S., Schmuck, C. (2017) Impact of peptides sequences on their structure and function: Mimicking of Virus-like Nanoparticles for Gene Delivery (both DNA and siRNA).
2. **Jana, P.**, Schmuck, C. (2017) Guanidiniocarbonyl pyrrole appended Naphthalene diimide as a pH-switchable DNA intercalator.

#### **B) Book chapter**

1. Samanta, K.; **Jana, P.**; Hirschhäuser, C.; Schmuck, C. (2017) Protein Surface Recognition by Synthetic Molecules. In: Atwood, J. L., (ed.) *Comprehensive Supramolecular Chemistry II*, vol. 4, pp. 295–349. Oxford: Elsevier. ISBN: 9780128031988.

#### **C) Publications presented at International Conferences**

1. **Jana, P.**, Maity, S., Haldar, D. “Nanoporous material by self-assembled foldamers: structure and function” FOLDAMERS: FROM DESIGN TO PROTEIN RECOGNITION, held at European Institute of Chemistry and Biology Bordeaux-Pessac, FRANCE on January 25 – January 28, 2010.
2. Haldar, D., Maity, S., **Jana, P.**, Maity, S. K., Bera, S. “Soft materials from foldamers: structure and function” European Institute of Chemistry and Biology Bordeaux-Pessac, FRANCE January 30 – February 2, 2012.
3. **Jana, P.**, Schmuck, C. “pH-responsive nanostructure of tripodal compound” Symposium on Bio Organic Supramolecular chemistry, Free University of Berlin, Germany, October 2014.
4. **Jana, P.**; Schmuck, C. “Guanidiniocarbonyl pyrrole appended naphthalene diimide as a pH-switchable DNA intercalator” Symposium on Humboldt foundation Annual meeting, University of Würzburg, Germany, September 2014.
5. **Jana, P.**; Schmuck, C. “Supramolecular assemblies of biomolecules by using non covalent interactions” 1<sup>st</sup> International Symposium on Supramolecular protein chemistry, University of Duisburg Essen, Germany, September 2015.
6. **Jana, P.**; Ehlers, M.; Zellermann, E.; Samanta, K., Schmuck, C. “pH-Controlled Formation of a Stable  $\beta$ -Sheet and Amyloid-like Fibers from an Amphiphilic Peptide: The Importance of a Tailor-Made Binding Motif for Secondary Structure Formation” SupraChem 2017, Institut für Inorganische Chemie, RWTH Aachen, Germany, February 12 – 14, 2017.

#### **D) Publications presented at National Conferences**

1. National Symposium on Recent Advances in Chemistry Research (RACR-2018), 11<sup>th</sup> March, **2018**, Department of Chemistry, Siksha-Bhavana, Visva-Bharati, Santiniketan.
2. Recent Trends in Interdisciplinary Sciences, February 12-14, **2018**, ISERC, Visva-Bharati, Santiniketan.
3. **Jana, P.**, Maity, S., Maity, S. K., Haldar, D. “*Stimuli responsive soft material from self-assembled peptides*” Symposium on polymer science **2011**, 10th December, IISER-KOLKATA, Mohanpur, West Bengal, India. (Poster presentation).
4. **Jana, P.**, Maity, S., Maity, S. K., Haldar, D. “*Molecular Self-assembly Of Synthetic Peptides into Porous Material: Structure and Function*” International Symposium on Recent Trend of Research in Chemistry, held at MIDNAPORE COLLEGE, Midnapore-721101, West Bengal, India, on 31st October-1st November **2011**. (Poster presentation).
5. Maity, S., **Jana, P.**, Haldar, D. “*Fabrication of nanoporous materials from hydrophobic peptides*” at the 1st in house symposium of IISER Kolkata, India held on **2010**, December 30-31. (Poster presentation).
6. Maity, S., **Jana, P.**, Haldar, D. “*Nanoporous material by self-assembly of synthetic peptide: structure and function*” at the “2nd Inter IISER chemistry Meet” at IISER Kolkata, India held on December 30-31, **2009**. (Poster presentation).

## Professional References

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