DR. INDRANATH CHAKRABORTY

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PERSONAL INFORMATION

Born: 02 February 1989; Modhyahizla, Hooghly, West Bengal, India.

CURRENT POSITION

May 2022-Onwards **Assistant Professor**
School of Nano Science and Technology,
Indian Institute of Technology Kharagpur
Kharagpur 721302, India.

POSITION HELD

Feb 2022-May 2022 **Assistant Professor**
School of Basic Sciences (Chemistry),
Indian Institute of Technology Mandi
Mandi 175005, India.

Apr 2018-Jan 2022 **Research Associate**
Center for Hybrid Nanostructure (CHyN),
(Parak Research Group)
University of Hamburg (UH), Hamburg 22761, Germany.

Apr 2016-Mar 2018 **Alexander von Humboldt Postdoctoral Research Fellow**
(Adviser: Prof. Dr. Wolfgang J. Parak), Dept. of Physics, Philipps University of Marburg (PUM), Marburg 35037, and CHyN, UH, Hamburg 22761, Germany.

May 2015–Mar 2016 **Postdoctoral Research Associate**
(Adviser: Prof. Prashant K. Jain), Dept. of Chemistry,
University of Illinois at Urbana Champaign (UIUC)
Illinois, USA.

Dec 2014-Apr 2015 **IITM Institute Postdoctoral Fellow**
(Adviser: Prof. T. Pradeep), Dept. of Chemistry,
Indian Institute of Technology Madras (IITM),
Chennai, India.

Jun 2014 **Visiting Research Scholar**
(Adviser: Prof. Terry Bigioni), Dept. of Chemistry,
University of Toledo, US.

May 2013-Jul 2013 **Visiting Research Scholar**
(Adviser: Prof. Yuichi Negishi), Dept. of Appl. Chemistry,
Tokyo University of Science, Tokyo, Japan.

EDUCATION

Jul 2011-Dec 2014 **Doctor of Philosophy** (Ph.D.)
(Supervisor: Prof. T. Pradeep), Dept. of Chemistry.
Indian Institute of Technology Madras (IITM), Chennai, India.
Thesis titled as "An investigation into the formation, functionalization, and applications of atomically precise silver clusters", defended on March 2015.

Jul 2009-Jun 2011 **Master of Science (MSc):** Chemistry
Indian Institute of Technology Madras (IITM), Chennai, India.
(thesis title: Luminescent Nobel Metal Cluster for Sensing, supervisor: Prof. T. Pradeep*)*

Jul 2006-Jun 2009 **Bachelor of Science (BSc):** Chemistry (Hons)
Ramakrishna Mission Vivekananda Centenary College, Rahara.
University of Calcutta, Kolkata, India.

ACADEMIC SUCCESS

- **2016-2018:** Alexander von Humboldt Postdoctoral Research Fellow.
- **2014-2015:** IITM Institute Postdoctoral Research Fellow.
- **2014:** Prestigious 'Malhotra Weikfield Foundation NanoScience Fellowship Award'.
- **2014:** J. C Bose patent award from IITM, Chennai, India.
- **2014:** INST-CNR Rao poster award in ICONSAT, Chandigarh, India.
- **2014:** Nanoscale poster prize award for the best poster in ICONSAT, Chandigarh, India.
- **2011:** R. Padmanabhan memorial prize (silver medal) in M.Sc. in chemistry.
- **2010-2011:** Institute merit scholarship for outstanding academic performance (among top ten students) at IIT-Madras.
- **2011:** CSIR-UGC NET (June) qualified with all India rank 32 (under LS).
- **2011:** GATE qualified with all India rank 118 (GATE score 594).
- **2009:** Qualified in Joint Admission Test for M.Sc. organized by IITs with all India rank 76.

AREA OF RESEARCH

My current research focuses on understanding **interfacial chemistry** at **an atomic scale** using several **analytical** methods such as spectroscopy, mass spectrometry, and microscopies. I'm also deeply involved in **the sustainable engineering of materials** for diverse **applications**.

RESEARCH INTEREST

- **Materials with atomic precision:** From fundamentals of physicochemical properties of metal nanoclusters (NCs) to designing NCs beyond noble metals
- **Advanced mass spectrometry of NCs:** Ion mobility mass spectrometry, gas-phase inter NCs reactions, CID, SID, dynamics of NC's reactions
- **Thin film with precise molecules:** 2D and 3D assembly of NCs, spin-coating, drop-casting, doctor-blading; optical properties, composite films
- **NC-based device fabrication:** Sensing, optoelectronic, microbe detection

TEACHING

2018 -21 (WiSe): 66-306 Methods in Nano-biotechnology II (theory class, master's level), UH
2019-20 (SuSe): 66-305 Methods in Nano-biotechnology I (theory class, master's level), UH
2019-20: Nanoscience practical for master's, sole instructor, UH.
2018-21 (SuSe/WiSe): Undergrad Practical, sole instructor, UH.
2016-17 (SuSe): FM B3, Methods in Nano-biotechnology (theory class, master's level), PUM.
2016-17 (WiSe): FM A3, Synthesis of gold nanoparticles and their phase transfer (practical class, master's); sole instructor, PUM.
2016-17 (SuSe): FM A3, Fluorescent nanoparticles (practical class, master's); sole instructor, PUM.
2016-17 (WiSe): FM Seminar, Fundamentals of Chemical Synthesis (master's, module I), PUM.
2016-17 (WiSe): FM A1, Fundamentals of Chemical Synthesis (theory class; module II, master's),

PUM.

2013: CY1001: Preparatory Chemistry Practical for PD students (undergrad), lab assistant (IITM).
2012: CY1001: Physical Chemistry (undergrad), teaching assistant (IITM).
2012: CY1001: Organic Chemistry Practical (undergrad), lab assistant (IITM).
2011: CY1001: Inorganic Chemistry Practical (undergrad), lab assistant (IITM).

MENTORING

PhD Students

(Official Supervisor Prof. Wolfgang J. Parak)

At PUM and UH: Lin Zhu (defended, 2019), Mustafa Gharib (defended, 2020), Yuan Zeng (Chinese Academy of Science Fellow, 3rd year), Lizhen Chen (Chinese Academy of Science Fellow, 3rd year), Yunhuan Yuan (Chinese Academy of Science Fellow, 2016-17, for short term), Charline Becker (2nd year), Miao Feng (Chinese Academy of Science Fellow, 1st year), Xin Liu (Chinese Academy of Science Fellow, 1st year).

Master Students

(Official Supervisor Prof. Wolfgang J. Parak)

At PUM and UH: Charline Becker (defended, 2019), Schanabe Maximillian (defended, 2018), Yu-Hsin Chang (defended, 2018), Shoaib Azeem (defended, 2018), Mahmoud Khalaf (defended, 2018), Yuan Zheng (defended, 2018), Sharmin Afroz (defended, 2018), Adam Basha (short-term, 2017), Gia Quyet Ngo (short-term, 2017).

(Official Supervisor Prof. T. Pradeep)

At IITM: Shrabani Mahata (summer fellow, NIST Berhampur), Jayanthi Erusappan (Stella Maris College, 2012), Anuradha Govindarajan (Stella Maris College, 2012), Sugi Shivan (Cochin University of Science and Technology, 2012), Anindya Ganguly (IITM, 2012), Avijit Baidya (IITM, 2013), Sreya Sarkar (IITM, 2014), Biswajit Mondal (IITM, 2015).

Bachelor Students

(Official Supervisor Prof. Wolfgang J. Parak)

At UH: Johannes Gebauer (Defended, 2020), Marie-Charlot Dalchow (short-term project, ongoing)

SKILLS

- Experienced in material synthesis, handling, and characterization.
- Excellent knowledge of nanocluster, alloy NCs, and their nanocomposites.
- Significant hands-on experience with UV-Vis, Fluorescence, FTIR, NMR, and Raman Spectroscopy. Experienced with analytical techniques such as GC, ITC, and HPLC.
- Expertise in different mass spectrometry such as ESI MS (Synapt HDMS G2, 3200 Q Trap LC/MS/MS, Thermo-Fisher Scientific LTQ ion trap mass spectrometer equipped with a DESI), MALDI MS (AB SCIEX MALDI MS, Brucker MALDI MS), ICP MS and GC MS.
- Well versed in material analysis techniques including XRD, TGA, and DLS.
- Expertise in single particle spectroscopy and dark-field microscopy (Andor microscope, Princetone microscope, Cytoviva HSI) of different nanosystems.

LIST OF PUBLICATIONS

Cover Pages

Top Five Selected Publications

//**J. Am. Chem. Soc.** 2021//
//***Chem. Rev.*** 2017//
//***Angew. Chem. Int. Ed.*** 2016//
//***Adv. Mater.*** 2016//
//***Nano Lett.*** 2012//

https://scholar.google.com/citations?user=76nWh7YAAAAJ&hl=en

All Publications

(h-index: 23, citations~3255)

A. Journals

1. **Chakraborty, I.**; Govindarajan, A.; Erusappan, J.; Ghosh, A.; Pradeep, T.; Yoon, B.; Whetten, R. L.; Landman, U. The superstable 25 kDa monolayer protected silver nanoparticle: measurements and interpretation as an icosahedral $Ag_{152}(SCH_2CH_2Ph)_{60}$ cluster. *Nano Lett.* **2012,** *12* (11), 5861-5866. *(Cit:127; IF:11.189)*

2. **Chakraborty, I.**; Udayabhaskararao, T.; Pradeep, T. Luminescent sub-nanometer clusters for metal ion sensing: A new direction in nanosensors. *J. Hazard. Mater.* **2012,** *211*, 396-403. *(Cit:60; IF:10.588)*.

3. **Chakraborty, I.;** Udayabhaskararao, T.; Pradeep, T. High temperature nucleation, and growth of glutathione protected ~Ag_{75} clusters. *Chem. Commun.* **2012,** *48* (54), 6788-6790. *(Cit:67; IF:6.222)*

4. **Chakraborty, I.**; Bag, S.; Landman, U.; Pradeep, T. Atomically precise silver clusters as new SERS substrates. *J. Phys. Chem. Lett.* **2013,** *4* (16), 2769-2773. *(Cit:47; IF:6.475)*

5. **Chakraborty, I.**; Kurashige, W.; Kanehira, K.; Gell, L.; Häkkinen, H.; Negishi, Y.; Pradeep, T. $Ag_{44}(SeR)_{30}$: A hollow cage silver cluster with selenolate protection. *J. Phys. Chem. Lett.* **2013,** *4* (19), 3351-3355. *(Cit:61; IF: 6.475)*

6. Sugi, K. S.; **Chakraborty, I.**; Udayabhaskararao, T.; Mohanty, J. S.; Pradeep, T. Evolution of atomically precise silver clusters to superlattice crystals. *Part. Part. Sys. Charac.* **2013**, *30* (3), 241-243. *(Cit:14; IF:3.310)*

7. Ganguly, A.; **Chakraborty, I.**; Udayabhaskararao, T.; Pradeep, T. A copper cluster protected with phenylethanethiol. *J. Nanopart. Res.* **2013**, *15* (4), 1-7. *(Cit:48; IF:2.253)*

8. **Chakraborty, I.**; Udayabhaskararao, T.; Deepesh, G.; Pradeep, T. Sunlight mediated synthesis and antibacterial properties of monolayer protected silver clusters. *J. Mater. Chem. B* **2013,** *1* (33), 4059-4064 (**Highlighted as Back Cover**). *(Cit:44; IF:6.331)*

9. **Chakraborty, I.**; Mahata, S.; Mitra, A.; De, G.; Pradeep, T. Controlled synthesis and characterization of the elusive thiolated Ag_{55} cluster. *Dalt. Trans.* **2014,** *43* (48), 17904 - 17907. *(Cit:13; IF:4.390)*

10. **Chakraborty, I.**; Bhuin, R. G.; Bhat, S.; Pradeep, T. Blue emitting undecaplatinum cluster. *Nanoscale* **2014,** *6* (15), 8561-8564. *(Cit:14; IF:7.790)*

11. **Chakraborty, I.**; Erusappan, J.; Govindarajan, A.; Sugi, K.; Udayabhaskararao, T.; Ghosh, A.; Pradeep, T. Emergence of metallicity in silver clusters in the 150 atom regime: a study of differently sized silver clusters. *Nanoscale* **2014,** *6* (14), 8024-8031. *(Cit:42; IF:7.790)*

12. **Chakraborty, I.**; Pradeep, T. Reversible formation of Ag_{44} from selenolates. *Nanoscale* **2014**, *6* (23), 14190-14194. *(Cit:10; IF:7.790)*

13. Sarkar, S.;‡ **Chakraborty, I.**;‡ Panwar, K. M.; Pradeep, T. Isolation and tandem mass spectrometric identification of a stable monolayer protected silver palladium alloy cluster. *J. Phys. Chem. Lett.* **2014**, *5* (21), 3757–3762 (‡contributed equally). *(Cit:18; IF:6.475)*

14. SenGupta, S.; **Chakraborty, I.**; Maliyekkal, S.; Mark, T.; Pandey, D.; Das, S.; Pradeep, T. Simultaneous dehalogenation, and removal of persistent halocarbon pesticides from water using

graphene nanocomposites: A case study of lindane, *ACS Sustain. Chem. Eng.* **2015**, *3* (6), 1155–1163. *(Cit:38; IF:8.198)*

15. Mondal, B.;‡ Som, A.;‡ **Chakraborty, I.**;‡ Baksi, A.; Sarkar, D.; Pradeep, T. Unusual nanoscale reactivity of MoS_2 nanosheets. *Nanoscale* **2016**, *8*, 10282-10290 (‡contributed equally). *(Cit:7; IF: 7.790)*

16. Som, A.; ‡ **Chakraborty, I.;** ‡ Maark, T.; ‡ Bhat, S.; Pradeep, T. Cluster Mediated Crossed Bilayer Precision Assemblies of 1D Nanowires. *Adv. Mater.* **2016,** *28* (14), 2827-2833 (‡contributed equally). *(Cit:23; IF:30.849)*

17. Krishnadas, K. R.; Ghosh, A.; Baksi, A. **Chakraborty, I.;** Natarajan, G.; Pradeep, T. Intercluster reactions between $Au_{25}(SR)_{18}$ and $Ag_{44}(SR)_{18}$. *J. Am. Chem. Soc.* **2016**, *138* (1), 140–148. *(Cit:106; IF:15.419)*

18. **Chakraborty, I.**;‡ Som, A.;‡ Maark, T.; Mondal, B.; Sarkar, D.; Pradeep, T. Towards a Janus Cluster: Regiospecific Decarboxylation of Ag_{44}(4-MBA)$_{30}$@Ag NP. *J. Phys. Chem. C,* **2016***, 120* (28), 15471–15479 (‡contributed equally). *(Cit:15; IF:4.126)*

19. Bhat, S.; **Chakraborty, I.**; Maark, T.; Mitra, A.; De, G., Pradeep, T. Atomically precise and monolayer protected iridium clusters in solution. *RSC Adv*., **2016**, *6*, 26679-26688. *(Cit:13; IF:3.361)*

20. Manju, C. K.; **Chakraborty, I.**; Pradeep, T. Highly luminescent monolayer protected $Ag_{56}Se_{13}S_{15}$ clusters. *J. Mater. Chem. C,* **2016,** *4*, 5572-5577 (designated as '**Hot Paper**'). *(Cit:9; IF:7.393)*

21. Smith, G. J.;‡ **Chakraborty, I.;**‡ Jain, K. P. In Situ Single-Nanoparticle Spectroscopy Study of Bimetallic Nanostructure Formation. *Angew. Chem. Int. Ed.* **2016**, *55* (34), 9979-9983 (‡contributed equally, **designated as top 10% publications**). *(Cit:33; IF:15.336)*

22. White, L. S; Banerjee, P; **Chakraborty, I.;** Jain, K. P. Ion exchange transformation of magic sized CdSe clusters, *Chem. Mater.* **2016**, *28* (22), 8391–8398. *(Cit:16; IF:9.811)*

23. Feliu, N.; Huhn, J.; Zyuzin, M.; Ashraf, S.; Valdeperez, D.; Masood, A.; Said, H. A.; Escudero, A.; Pelaz, B.; Gonzales, E.; Correa-Duarte, A. M.; Roy, S.; **Chakraborty, I**; Lim, L. M.; Sjöqvist, S.; Jungebluth, P.; Parak, W.; Quantitative uptake of colloidal particles by cell cultures, *Sci. Tot. Environ.,* **2016**, *568*, 819-828. *(Cit:31; IF:7.963)*

24. Hühn, J.; Carrillo, C.; Soliman, G. M.; Pfeiffer, C.; Valdeperez, D.; Masood, A.; **Chakraborty, I.;** Zhu, L.; Gallego, M; Zhao, Y.; Carril, M.; Feliu, N.; Escudero, A.; Alkilany, M. A.; Pelaz, B.; del Pino, P.; Parak, W. Selected Standard Protocols for the Synthesis, Phase Transfer, and Characterization of Inorganic Colloidal Nanoparticles, *Chem. Mater.* **2017**, *29* (1), 399–461. *(Cit:166; IF:9.811)*

25. Jeseentharani, V.; Pugazhenthiran, N.; Mathew, A.; **Chakraborty, I.;** Baksi, A.; Anjusree, G. S.; Deepak, T. G.; Mohanty , J. S.; Nair, A . S.; Pradeep, T. Photovoltaic Study of Atomically Precise Metal Cluster Sensitized Solar Cell, *Chem. Select.* **2017**, *2* (4), 1454-1463. *(Cit:19; IF:2.109)*

26. Bhattarai, B.; **Chakraborty, I.**; Conn, B.; Atnagulov, A; Pradeep, T. Bigioni, T. High-Yield Solvent-Free Synthesis of Single-Sized Molecular Silver Nanoparticles. *J. Phys. Chem. C.* **2017,** *121* (20), 10964–10970. *(Cit:8; IF:4.126)*

27. **Chakraborty, I**; Pradeep, T. Atomically Precise Clusters of Noble Metals: Emerging Link Between Atoms and Nanoparticles, *Chem. Rev.* **2017,** *117* (12), 8208–8271 (Designated as "**Most read articles**" in Jun-Aug, 2017). *(Cit:922; IF:60.622)*

28. **Chakraborty, I.;** Feliu, N.; Roy. S. Dawson, K.; Parak, W. Protein-mediated shape-control of silver nanoparticles, *Bioconjug. Chem.* **2018,** *29* (4), 1261–1265. *(Cit:32; IF:4.774)*

29. Zyuzin, V. M.; Baranov, G. D.; Escudero, A.; Yankovich, B. A.; **Chakraborty, I.;** Tsypkin, A.; Ushakova, V. E.; Kraus, F.; Parak, W. Makarov, V. S. Resonant Silicon Particles as a Platform for Low-Quenching Photoluminescence, *Sci. Rep.* **2018**, *8*, 6107. *(Cit:24; IF:4.379)*

30. **Chakraborty, I.;** de Aberasturi. D. J.; Pazos-Perez, N.; Guerrini, L.; Masood, A.; Alvarez Puebla, R.; Feliu, N.; Parak, W.; Ion-selective ligands: how colloidal nano- and mirco-particles can introduce new functionalities, *Z. Phys. Chem*. **2018**, 232(9–11), 1307–1317 (Invited article). *(Cit:6; IF:2.408)*

31. Ziefuß, R. A.; Reichenberger, S.; Rehbock, C.; **Chakraborty, I.;** Gharib, M.; Parak, W.; Huang, H.; Zhigilei, L. V.; Barcikowski, S. Laser fragmentation of colloidal gold nanoparticles with high-intensity nanosecond pulses is driven by a single-step fragmentation mechanism with a defined educt particle-size threshold, *J. Phys. Chem. C*, **2018**, *122* (38), 22125-22136. *(Cit:43; IF:4.126)*

32. Zeng, Y. Chang, Y.; Gharib, M.; Parak, W. **Chakraborty, I.;*** Understanding the Interaction of Glutamate Salts with Serum Albumin Protected Prism-Shaped Silver Nanoparticles toward Glutamate Sensing, *Part. Part. Sys. Charact.* **2019**, *36*, 1800229.(***corresponding author, selected as front cover**). *(Cit:6; IF:3.310)*

33. Sun, X.; Gamal, M., Nold, P., Said, A.; **Chakraborty, I.;** Pelaz, B.; Schmeid, F., Puckler, K.; Figiel, J.; Zhao, Y.; Brendel, C.; Hasssan, M.; Parak, W. Feliu, N.; Tracking stem cells and macrophages with gold and iron oxide nanoparticles – The choice of the best suited particles, *App. Mater. Today.* **2019,** *15*, 267-279. *(Cit:21; IF :10.041)*

34. **Chakraborty, I.;** Parak, W. Protein Induced Shape Controls of Noble Metal Nanoparticles, *Adv. Mater. Interface.* **2019,** *6*, 1801407 (**selected as front cover**). *(Cit:21; IF:6.147)*

35. Zhu, L.; Pelaz, B.; **Chakraborty, I.;** Parak, W. Investigating Possible Enzymatic Degradation on Polymer Shells around Inorganic Nanoparticles, *Int. J. Mol. Sci.* **2019,** *20*, 935. (Invited article) *(Cit:10; IF:5.923)*.

36. Heuer-Jungemann, A.; Feliu, N.; Bakaimi, I.; Hamaly, M.; AlKilany, A.; **Chakraborty, I.;** Masood, A.; Casula, M.; Kostopoulou, A.; Susumu, K.; Stewart, M.; Medintz, I.; Stratakis, E.; Parak, W.; Kanaras, A.; The Role of Ligands in the Chemical Synthesis and Applications of Inorganic Nanoparticles, *Chem. Rev.* **2019**, *119* (8), 4819-4880. (Designated as "**Most read articles**" in Apr-Jun 2019, **selected as front cover**) *(Cit:212; IF:60.622)*.

37. Gharib, M.; Khalaf, M; Afroz, S.; Feliu, N; Parak, W. **Chakraborty, I.; *** Sustainable Synthesis and Improved Colloidal Stability of Popcorn-Shaped Gold Nanoparticles, *ACS Sustain. Chem. Eng.* **2019**, *7* (11), 9834-9841. (***corresponding author**) *(Cit:15; IF:7.632)*.

38. Gharib, M.; Kornowski, A.; Noei, H.; Parak, W.; ***Chakraborty, I.;*** Protein-Protected Porous Bimetallic AgPt Nanoparticles with pH-switchable Peroxidase/Catalase-Mimicking Activity. *ACS Materials Lett.* **2019,** *1* (3), 310-319. (***corresponding author,** Designated as "**Most read articles**" in Aug-Oct, **selected as front cover**) *(Cit:12; IF:8.312)*.

39. Roy, S.; Liu, Z.; Sun, X.; Gharib, M.; Yan, H.; Huang, Y.; Megahed, S.; Schnabel, M.; Zhu, D.; Feliu, N.; **Chakraborty, I.;** Sanchez-Cano, C.; Alkilany, A. M.; Parak, W. J., Assembly and Degradation of Inorganic Nanoparticle in Biological Environment. *Bioconjugate Chem.* **2019,** *30(11)*, 2751-2762. *(Cit:15; IF:4.774)*.

40. Gharib, M.; Kornowski, A.; Noei, H.; Parak, W.;***Chakraborty, I.;*** Correction to Protein-Protected Porous Bimetallic AgPt Nanoparticles with pH-switchable Peroxidase/Catalase-Mimicking Activity. *ACS Materials Lett.* **2019***, 1 (4), 466-466.* (***corresponding author**) *(Cit:NA; IF:8.312)*.

41. Holzapfel, M.; Mutas, M.; Chandralingham, S.; von Salisch, C.; Peric, N.; Segelke, T.; Fischer, M.; **Chakraborty, I.**; Parak, W.; Frangioni, J.; Maison, W.; A Non-Radioactive Cell Assay for the Evaluation of Modular Prostate-Specific Membrane Antigen Targeting Ligands via Inductive Coupled Plasma Mass Spectrometry*, J. Med. Chem.* **2019***, 62* (23*),* 10912-10918. *(Cit:1; IF:7.446)*.

42. Zhu, L.; Gharib, M.; Becker, C.; Zeng, Y.; Ziefuß, A. R.; Chen, L.; Alkilany, A. M.; Rehbock, C.; Barcikowski, S.; Parak, W.; **Chakraborty, I.;*** Synthesis of Fluorescent Silver Nanoclusters: Introducing Bottom-up and Top-down Approaches to Nanochemistry in a Single Laboratory Class, *J. Chem. Edu,* **2020***, 97(1),* 239-243 (***corresponding author**). *(Cit:10; IF:2.979)*.

43. Liu, Z.; Escudero, A.; Carrillo, C.; **Chakraborty, I.;** Zhu, D.; Gallego, M.; Parak, W.; Feliu, N. Biodegradation of bi-labelled polymer-coated rare-earth nanoparticles in adherent cell cultures, *Chem. Mater.,* **2020***, 32(1),* 245-254. *(Cit:7; IF:9.811)*.

44. Padro, D.; Cienskowski, P.; Lopez-Fernandez, S.; **Chakraborty, I.**; Carrillo-Carrion, C.; Feliu, N.; Parak, W.; Carril, M.; Towards diffusions measurements of colloidal nanoparticles in biological environments, *Small,* **2020,** *16,* 2001160**.** *(Cit:5; IF:13.281)*.

45. Ziefuß, A.; Haxhiaj, I.; Müller, S.; Gharib, M.; Gridina, O.; Rehbock, C.; **Chakraborty, I**; Peng, B.; Muhler, M.; Parak, W; Barcikowski, S.; Reichenberger, The origin of laser-induced colloidal gold surface oxidation and charge density, and its role in oxidation catalysis, *J. Phys. Chem. C.* **2020**, *124* (38), 20981–20990 (**selected as front cover**) *(Cit:6; IF:4.126)*.

46. Baksi, A.; Schneider, E.; Weis, P.; **Chakraborty, I.;** Fuhr,O.; Lebedkin, S.; Parak, W.; Kappes, M.; Linear Size Contraction of Ligand Protected Ag_{29} Clusters by Substituting Ag with Cu, *ACS Nano*, **2020,** *14* (11), 15064–15070 *(Cit:4; IF:15.881)*.

47. Chen, L.; Azeem, S.; Ruan, M.; Xu, W.; Barck, A.; Parak, W.; **Chakraborty, I.;*** Rapid template-guided ligand-free synthesis of ultrasmall PtNCs with efficient hydrogen evolution reaction activity and their versatile release, *Nano Select,* **2021,** *2*(4), 758-767 (***corresponding author, selected as front cover**). *(Cit:NA; IF:NA)*.

48. Gharib, M.; Galchenko, M.; Klinke, C.; Parak, W.; **Chakraborty, I.;*** Mechanistic insights and selected synthetic routes of atomically precise metal nanoclusters, *Nano Select,* **2021,** *2*(5), 831-846 (***corresponding author, selected as front cover**). *(Cit:NA; IF:NA)*.

49. Sanchez-Cano, C.; Puebla, R.; Abendroth, J.; Beck, T.; Blick, R.; Cao, Y.; Caruso, F.; **Chakraborty, I.;** Chapman, H.; Chen, C.; et al. X-Ray-Based Techniques to Study the Nano-Bio Interface, *ACS Nano* **2021,** *15*(3), 3754–3807 (**Author and editor choice** article, Designated as "**Most read articles**" in Mar-) *(Cit:1; IF:15.881)*.

50. Zhu, L.; Teubner, M.; Grimm-Lebsanft, B.; Ziefuß, A.; Rehbock, C.; Rübhausen, M.; Barcikowski, S.; Parak, W.;* **Chakraborty, I.*** Surface Engineering of Gold Nanoclusters Protected with 11-Mercaptoundecanoic Acid for Photoluminescence Sensing, *ACS Appl. Nano Mater.* **2021**, *4* (3), 3197–3203 (***corresponding author**) (*Cit:1; IF:5.097*).

51. Hühn, J.; Carrillo, C.; Soliman, G. M.; Pfeiffer, C.; Valdeperez, D.; Masood, A.; **Chakraborty, I.;** Zhu, L.; Gallego, M; Zhao, Y.; Carril, M.; Feliu, N.; Escudero, A.; Alkilany, M. A.; Pelaz, B.; del Pino, P.; Parak, W. Correction to Selected Standard Protocols for the Synthesis, Phase Transfer, and Characterization of Inorganic Colloidal Nanoparticles, *Chem. Mater*. **2021**, *33* (12), 4830. *(Cit: NA; IF:9.811)*

52. Ziefuß, R. A.; Steenbock, T.; Benner, D.; Plech, A.; Göttlicher, J.; Teubner, M.; Grimm-Lebsanft, B.; Rehbock, C.; Comby-Zerbino, C.; Antoine, R.; Amans, D.; **Chakraborty, I.;** Bester, G.; Nachev, M.; Sures, B.; Rübhausen, M.; Parak, W.; Barcikowski, S.; Photoluminescence of fully inorganic colloidal gold nanocluster and their manipulation using surface charge effects, *Adv. Mater*, **2021,** *33* (31), 2101549 *(Cit:NA; IF:30.849)*.

53. Rodrigues, J.; Becker, C.; Sedrine, N. B.; Kamp, M.; Kienle, L.; Adelung, R.; Mishra, Y.; Parak, W.; **Chakraborty, I.;*** Correia, M. R.; Monteiro, T.;* Luminescent Silver Nanoclusters Decorated on ZnO Tetrapods: Detailed Understanding of Their Role on Photoluminescence Features, *J. Mater. Chem. C,* **2021,** *9*, 7014-7026 (Featured as **Back cover**, ***corresponding author**) *(Cit:NA; IF:7.393)*.

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57. Becerril-Castro, I. B.; Calderon, I.; Pazos-Perez, N.; Guerrini, L.; Schulz, F.; Feliu, N.; **Chakraborty, I.;** Giannini, V.; Parak, W. J.; Alvarez-Puebla, R. A., Gold Nanostars: Synthesis, Optical and SERS Analytical Properties. *Analysis & Sensing*, **2022**, e202200005 (VIP, featured as front cover).

58. Sitia, G.; Fiordaliso, F.; Violatto, M. B.; Alarcon, J. F.; Talamini, L.; Corbelli, A.; Ferreira, L. M.; Tran, N. L.; Chakraborty, I.; Salmona, M. Food-Grade Titanium Dioxide Induces Toxicity in the Nematode Caenorhabditis elegans and Acute Hepatic and Pulmonary Responses in Mice. *Nanomaterials* **2022,** *12* (10), 1669.

B. Conference paper

1. Pradeep, T.; Bhat, S.; **Chakraborty, I**.; Baksi, A.; Pradeep, R. Understanding the evolution of atomically precise clusters using mass Spectrometry. *ISMAS*, **2015**.

2. Bhattarai, B.; **Chakraborty, I**.; Conn, B.; Atnagulov, A; Pradeep, T. Bigioni, T. Thinking Green with Molecular Silver Nanoparticle Production, *Bulletin of the American Physical Society*, **2016**, *61*, 12.

3. Bhattarai, B.; **Chakraborty, I**.; Conn, B.; Atnagulov, A; Pradeep, T. Bigioni, T. Greener Nanoparticle Manufacturing: High-Yield Paste-Based Synthesis of Thiolate-Protected Silver Nanoparticles, ACS Summer School in Green Chemistry and Sustainable Energy, **2017**.

C. Book chapter

1. Bhat, S.; **Chakraborty, I.**; Baksi, A.; Pradeep, R; Pradeep, T. Evolution of atomically precise clusters through the eye of mass spectrometry, *Nanoscience*, **2016**, 3, 343-385.

2. **Chakraborty, I**.; Nanoclusters of other metals (excluding Ag and Au), **2022** (in press)

D. Patents

1. A method for preparing monolayer protected silver clusters as antibacterial agents. T. Pradeep, **Indranath Chakraborty**, T. Udayabhaskararao, G.K. Deepesh , 485/CHE/2013, filed on 04-02-2013 (IN) (**Granted**).

2. Dechlorination of lindane and its removal from water using graphene nanocomposites. T. Pradeep, Soujit SenGupta, **Indranath Chakraborty** and Shihabudheen M. Maliyekkal, 5988/CHE/2013, filed on 20-12-2013 (IN) (**Granted**).

3. Method of making alloys of precise composition using inter-cluster reactions in solution. T. Pradeep, KR Krishnadas, Atanu Ghosh, Ananya Baksi, **Indranath Chakraborty**, Ganapati Natarajan, 6907/CHE/2015, filed on 14-12-2015 (IN) (**Granted**).

4. Method for preparing crossed bilayer assembly of 1D nanowires using an atomically precise clusters. T. Pradeep, Anirban Som, **Indranath Chakraborty**, Tuhina A. Maark, Shridevi Bhat, 6993/CHE/2015, filled on 28-12-2015 (IN) (**Granted**).

SCIENTIFIC PRESENTATIONS

2013: Oral seminar at Tokyo University of Science, Tokyo, Japan ("Syntehsis and Characterization of *selenolate protected atomically precise silver cluster*").

2015: Oral seminar at University of Illinois at Urbana Champaign, IL, US ("*Synthesis and properties of atomically precise silver nanoclusters*").

2017: Oral seminar at Philipps University of Marburg, Germany ("Synthesis and Characterization of Noble Metal Nanoclusters")

2017: Oral seminar at Philipps University of Marburg, Germany ("Nanoclusters in Biology").

2018: Seminar talk at CGCRI, Kolkata ("Tuning Nanoparticle Surfaces : From Cluster Induced Assembly to Dynamics at Single Particle Level")

2018: Seminar talk at Chemistry Department, IIT Delhi ("Tuning Nanoparticle Surfaces : From Cluster Induced Assembly to Dynamics at Single Particle Level")

2018: Seminar talk at Chemistry Department, IIT Indore ("Tuning Nanoparticle Surfaces : From Cluster Induced Assembly to Dynamics at Single Particle Level")

2018: Seminar talk at CeNSE, IISc ("Tuning Nanoparticle Surfaces : From Cluster Induced Assembly to Dynamics at Single Particle Level")
2018: Seminar talk at Chemistry Department, IISER Mohali ("Tuning Nanoparticle Surfaces : From Cluster Induced Assembly to Dynamics at Single Particle Level")
2018: Invited talk at IC PMS conference in Madrid ("Effects of Proteins in Tuning Nanoparticle Surfaces")
2018: Seminar talk at Chemistry Department, IIT Dharwad ("Unravelling the Hidden Chemistry at Nanoparticle Surfaces")
2018: Invited keynote talk at EMRS Fall 2018, Warsaw ("Understanding the protein directed shape control")
2019: Seminar talk at EMRS Spring, Symposium V, Nice ("Toward a Janus Cluster: Regiospecific Decarboxylation of Ag_{44}(4-MBA)$_{30}$@Ag Nanoparticles")
2019: Seminar talk at EMRS Spring, Symposium L, Nice ("Protein Mediated Shape Control of Noble Metal Nanoparticles")
2020: Invited seminar talk at Centre of Nanotechnology, IIT Roorkee ("Materials with atomic precision")
2020: Invited seminar talk at CHyN-HARBOR, University of Hamburg ("Materials with atomic precision")
2021: Invited seminar talk at School of Chemistry and Biochemistry, Yeungnam University, South Korea ("Materials with atomic precision")

RESEARCH GRANTS

2016-2018: Humboldt Postdoc Fellowship (85k Eur, completed)
2018: COST Travel grant (700 Eur, completed)
2019-2022: Fonds-Verband der Chemischen Industrie (seed grant, 10k Eur, PI, completed)
2020-2021: CUI assistance grant (2k Eur, PI, completed)

PROFESSIONAL ACTIVITIES

- Reviewer of the peer review journals such as *Science* (1), *Nat. Commun.* (3), *Adv. Mater*. (3), *J. Am. Chem. Soc*. (1), *ACS Nano* (40), *Chem. Mater.* (2), *ACS Sustain. Chem. Eng. (3), J. Nanobiotechnology* (1), *J. Phys. Chem. C* (2), *J. Chem. Edu* (2), and *J. Mater. Chem. A* (1).
- Member of organizing committee in several conferences; 2nd Indo-Korea joint workshop, Indo-US workshop on water purification, Chennai Chemistry Conference, Discussion Meeting on the Implications of Mass Spectrometry Imaging, 2nd International Conference on Emerging Technologies for Clean Water at IITM and NaNaX 7 at Uni. Marburg.
- Sub-group leader in Parak group at Uni Marburg and Uni Hamburg.
- Reviewer board member of Nanomaterials journal.
- Life member of 'Alumni Deutschland'.