Pramod P. Pillai

Contact Information

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Research Interests

Physical chemistry, Nanomaterials, Photochemistry and Photophysics, Light harvesting materials, Self-assembly, Nano-bio interactions

Education

Ph. D., 2008

National Institute for Interdisciplinary Science and Technology (NIIST), Trivandrum, India

M.Sc. Chemistry, 2004

Mahatma Gandhi University, Kottayam, India

B. Sc. Industrial Chemistry, 2001

Mahatma Gandhi University, Kottayam, India

Research Experience/ Employment History

Assistant Professor **2014 - present**
Indian Institute of Science Education and Research Pune, India

Postdoctoral research **2011 - 2014**
Northwestern University, Illinois, U. S. A.
Advisor: Prof. Bartosz A. Grzybowski

- Fabricated novel electrically bistable devices based on metal-polymer nanocomposite with controllable dielectric breakdown.
- Developed a general strategy to self-assemble colloids and nanomaterials, by modulating magnetic fields at the micron-scale.
- Designed and developed new family of mixed charge nanomaterials with unique chemical (stability, self-assembly etc.) and biological (antimicrobial, cellular uptake etc.) properties.

Postdoctoral research **2008 - 2010**
Technical University, Dortmund, Germany
Advisor: Prof. Christof M. Niemeyer

- Incorporated semiconductor nanomaterials into colloidal silica nanospheres for cell imaging studies.
- Bio-functionalized luminescent colloidal silica beads for DNA hybridization studies.
- Designed and studied energy transfer process between luminescent silica beads and fluorescent proteins.

Ph. D. research **2004 - 2008**

NIIST, Trivandrum, India

Advisor: Prof. K. George Thomas

- Published first report on the covalent functionalization of ruthenium trisbipyridine chromophores on gold nanoparticles and tuned their optoelectronic properties.
- Improved the electron accepting properties of single-walled carbon nanotubes through covalent functionalization of metal nanoparticles.
- For the first time, experimentally demonstrated the existence of edge effect in gold nanorods.
- Controlled the plasmon coupling in dimers of gold nanorods using aromatic and alkyl dithiols.

Awards

- Awarded the prestigious *Alexander von Humboldt fellowship* in November 2008.
- *Best poster award* in February 2008 for the All India Chemistry Symposium conducted by the Chemical Research Society of India (CRSI).
- Qualified the prestigious all India *CSIR-JRF/NET* exam of the Council of Scientific and Industrial Research, Government of India in June 2003.
- Qualified Graduate Aptitude Test in Engineering (*GATE*) in 2006.
- University *second rank* for M.Sc. Chemistry.
- University *first rank* (Topper) for B.Sc. Industrial Chemistry.

Publications

1) **Pillai, P. P.**; Kowalczyk, B.; Grzybowski, B. A. "Self-assembly of Like-Charged Nanoparticles into Microscopic Crystals" *Nanoscale* **2015**, *Advanced Article* DOI: 10.1039/C5NR06983A
2) Yan, Y.; **Pillai, P. P.**; Timonen, J. V. I.; Emami, F. S.; Vahid, A.; Grzybowski, B. A. "Synthesis of Toroidal Gold Nanoparticles Assisted by Soft Template" *Langmuir* **2014**, *30*, 9886-9890.
3) Zhuang, Q.;* Warren, S. C.;* Baytekin, B.; Demirörs. A. F.; **Pillai, P. P.**; Kowalczyk, B.; Grzybowski, B. A. "Mechanical Control of Surface Adsorption by Nanoscale Cracking" *Adv. Mater.* **2014**, 26, 3667-3672
4) Demirörs. A. F.; **Pillai, P. P.**; Kowalczyk, B.; Grzybowski, B. A. "Colloidal Assembly Directed by Virtual Magnetic Moulds" *Nature* **2013**, *503*, 99-103.
5) **Pillai, P. P.**; Huda, S.; Kowalczyk, B.; Grzybowski, B. A. "Controlled pH Stability and Adjustable Cellular Uptake of Mixed-Charge Nanoparticles" *J. Am. Chem. Soc.* **2013**, *135*, 6392-6395.
6) **Pillai, P. P.**; Pacławski, K.; Kim, J.; Grzybowski, B. A. "Nanostructural Anisotropy Underlies Anisotropic Electrical Bistability" *Adv. Mater.* **2013**, *25*, 1623-1628.
7) **Pramod, P.**; Soumya, C. C.; Thomas, K. G. "Gold Nanoparticle-Functionalized Carbon Nanotubes for Light-Induced Electron Transfer Process" *J. Phys. Chem. Lett.* **2011**, *2*, 775-781.
8) **Pillai, P. P.**; Reisewitz, S.; Schroeder, H.; Niemeyer, C. M. "Quantum Dot-Encoded Silica Nanospheres for Nucleic Acid Hybridization" *Small* **2010**, *6*, 2130-2134.

9) **Pramod, P.**; Thomas, K. G.; George, M. V. "Organic Nanomaterials: Morphological Control for Charge Stabilization and Charge Transport" *Chem. Asian J.* **2009**, *4*, 806- 823.

10) **Pramod, P.**; Thomas, K. G. "Plasmon Coupling in Dimers of Au Nanorods" *Adv. Mater.* **2008**, *20*, 4300–4305.

11) **Pramod, P.**; Joseph, S. T. S.; Thomas, K. G. "Preferential Functionalization of Au nanorods Through Electrostatic Interactions" *J. Am. Chem. Soc.* **2007**, *129*, 6712-6713.

12) Jebb, M.; Sudeep, P. K.; **Pramod, P.**; Thomas, K. G; Kamat, P. V. "Interaction of thiol derivative of Ru(II)trisbipyridyl complex with gold nanorods. Morphological changes and excited state interactions" *J. Phys. Chem. B* **2007**, *111*, 6839-6844.

13) **Pramod, P.**; Sudeep, P. K.; Thomas, K. G.; Kamat, P. V. "Photochemistry of Ruthenium Trisbipyridine Functionalized on Gold Nanoparticles" *J. Phys. Chem. B* **2006**, *110*, 20737-20741.

14) Joseph, S. T. S.; Ipe, B. I.; **Pramod, P.**; Thomas, K. G. "Gold Nanorods to Nanochains: Mechanistic Investigations on their Longitudinal Assembly Using α,ω-Alkanedithiols and Interplasmon Coupling" *J. Phys. Chem. B* **2006**, *110*, 150-157.

Selected Presentations

1) Optical Properties of Metal and Semiconductor Nanoparticles,
In *"Gordon Research Conference on Noble Metal Nanoparticles"* held at South Hadley, Boston, (U. S.A.) June 20-25, 2010.

2) Preferential End Functionalization of Au Nanorods,
In *"Indo-Japan Cooperative Science Programme"* held at Trivandrum, (India) January 20-22, 2008.

3) Exploring the Edge Effects in Au Nanorods,
In "*10th National Symposium in Chemistry"* held at IISc, Bangalore, (India) February 01-03, 2008.

4) Gold Nanoparticle Functionalized Carbon Nanotubes for Light Induced Electron Transfer Process,
In *"JNC Research Conference on Chemistry of Materials"* held at Munnar, (India) September 28-October 01, 2007.

5) Tuning the Optical Properties of Gold Nanorods,
In *"International Winter School on the Chemistry of Materials"* held at Bangalore, (India) December 12-19, 2006.

6) Chromophore Functionalized Gold Nanoparticles: Effect of Spacer, Core Size and Redox Properties,
In "*International Conference on Nanoscience and Technology (ICONSAT)"* held at Delhi, (India) March 16-18, 2006.

References

Prof. K. George Thomas
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