Debabrata Patra
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Education

Ph.D. Department of Chemistry: University of Massachusetts, Amherst, USA November, 2010
Advisor: Prof. Vincent M. Rotello
Thesis: "Colloidal Microcapsules: Surface Engineering of Nanoparticles for Interfacial Assembly".
M.Sc. Department of Chemistry: Indian Institute of Technology, Bombay, India, May, 2005
Advisor: Prof. C. P. Rao
Thesis: "Synthesis and characterization of glycosyl amine and their metal ion complexes".
B.Sc. Chemistry (Honors): Midnapore College, WB, India. May, 2003

Professional & Other Experiences

Postdoctoral Research: Texas A&M University, College Station, Material Science and Engineering.
Advisor: Prof. Jaime C. Grunlan April' 2013- Present
Postdoctoral Research: The Pennsylvania State University, University Park, Department of Chemistry.
Advisor: Prof. Ayusman Sen Jan' 2011-Mar' 2013
Research Assistant: Chemistry, University of Massachusetts, Amherst 2006-2010
Teaching Assistant: (Chem 111 Lab, Chem 112 Lab) 2005-2006
Laboratory Mentoring: Supervised both undergraduate and graduate students to build their scientific insight and perspective in research.
University Collaboration: University of Massachusetts, Lowell, USA; Bogazici University, Istanbul, Turkey; University of Glasgow, Glasgow, UK.
Industrial Collaboration: Supervising project funded by Saint-Gobain, France April'2013-Present

Research Experience

Doctoral Research @ University of Massachusetts

- Self-assembly of nanoparticles via supramolecular interactions.
- Self-assembly of nanoparticles at liquid-liquid interface.
- Surface engineering of nanoparticles for interfacial assembly.
- Tuning covalent and noncovalent interactions between nanoparticles at oil-water interface to create stable emulsions and microporous capsules.
- Stabilizing protein/nanoparticle complex at oil-water interface and designing biocatalytic microcapsules.

Postdoctoral Research @ Pennsylvania State University

- Stimuli responsive micropumps using supramolecular "host-guest" interaction.
- Self-powered microdevices by surface immobilized enzymes,
- Stimuli responsive autonomous cargo & drug delivery systems.

Postdoctoral Research @ Texas A&M University

- Polymer nanocomposites via layer-by-layer (LBL) assembly.
- LBL nanocoatings on thermoplastics, foams and fabric for flame retardant applications.
- LBL nanocoatings of polymer-clay for gas barrier applications.

Skills

- **Synthesis:** Organic synthesis and size selective nanoparticle synthesis (metallic e.g. Au, magnetic FePt/Fe_3O_4 and semiconductor e.g. PbS/PbSe, CdSe).
- Surface engineering of nanoparticles.
- **Spectroscopy:** FTIR, NMR, UV-Vis, ISI-MS, Fluorescence.
- **Microscopy:** Optical, Fluorescence, SEM, TEM, AFM, Image analysis.

- **Thermal Analysis:** TGA, DSC.
- **Flame Retardant Tests:** Vertical and horizontal flame test for foam and fabric.
- **Others:** Small Angle X-ray Scattering (SAXS), DLS, Zeta potential, Tensiometer, Ellipsometer, Quartz Crystal Microbalance (QCM).

Awards

- ***Graduate Student Travel Grant Award*** by University of Massachusetts (2010).
- ***Joint Admission Test for M.Sc.*** conducted by IITs (top 10%) (2005).
- ***University Medal*** for 1st Class in B.Sc.; Midnapore College, India (2003).
- **Birla Science Award** (1995).
- **High School Scholarship** (1994).

Publications

(21) **Patra, D.**; Vangal, P.; Grunlan, J. C. "All Inorganic Flame Retardant Multilayer Nanocoatings for Polyurethane from Aqueous Polyelectrolyte Solution" *Manuscript to be submitted in ACS Appl. Mater. Interface, **Feb, 2014.***

(20) Sengupta, S. †; **Patra, D.** †; Rivera, I. O. †; Agrawal, A.; Dey, K. K.; Shklyaev, S.; Mallouk, T. E.; Sen A. "Self-powered Enzyme Micropumps" *Under minor revision in Nature Chemistry* (†authors contribute equally).

(19) **Patra, D**.; Zhang, H.; Sengupta, S.; Sen, A. "Dual Stimuli-Responsive, Rechargeable Micropump via Host-Guest Interactions" *ACS Nano*, **2013,** *7*, 7674-7679.

(18) **Patra, D**.; Sengupta, S.; Duan, W.; Zhang, H.; Pavlick, R.; Sen, A. "Intelligent, Self-Powered Delivery Systems" *Nanoscale*, **2013**, *5*, 1273-1283.

(17) Jeong, Y.; **Patra, D.**; Sanyal, A.; Rotello V. M. "Fabrication of Stable Nanoparticle-Based Colloidal Microcapsules" *Curr. Org. Chem.,* **2013**, *17*, 49-57.

(16) Xi, Y.; Pham, J. T.; Subramani, C.; Creran, B.; Yeh, Y. C.; Du, K.; **Patra, D.**; Miranda, O. M.; Crosby A. J.; Rotello, V. M. "Direct Patterning of Engineered Ionic Gold Nanoparticles via Nanoimprint Lithography" *Adv. Mater.,* **2012,** 24, 6330-6334.

(15) Abul-Kashem, M. M.; **Patra, D.;** Perlich, J.; Buffet, A.; Roth, S. V.; Rotello, V. M.; Muller-Buschbaum, P. " Two- and Three-dimensional Network of Nanoparticles via Polymer-Mediated Self-Assembly" *ACS Macro Lett.*, **2012**, 1, 396-399.

(15) Rana, S.; Xi, Y. †; **Patra, D.** †; Moyano, D. F.; Miranda, O. R.; Hussain, I.; Rotello, V. M.; "Control of Surface Tension at Liquid–Liquid Interfaces Using Nanoparticles and Nanoparticle-Protein Complexes" *Langmuir*, **2012**, *28*, 2023–2027 († authors contribute equally).

(13) Yeh, Y. C.; **Patra, D**.; Yan, B.; Saha, K.; Miranda, O. M.; Kim, C. K.; Rotello, V. M. " Synthesis of Cationic Quantum Dots via a Two-step Ligand Exchange Process" *Chem. Commun.*, **2011**, *47*, 3069-3071.

(12) **Patra, D.**; Sanyal, A.; Rotello, V. M. "Colloidal Microcapsule: A Self-assembly Approach at Liquid-Liquid interface" *Chem. Asian. J.,* **2010,** *5*, 2442-2453.

(11) **Patra, D.**; Malvankar, N.; Chin, E.; Tuominen, M.; Gu, Z.; Rotello, V. M. "Fabrication of Conductive Microcapsules via Self-assembly and Crosslinking of Gold Nanowires at Liquid-Liquid Interface" *Small,* **2010,** *6***,** 1402-1405.

(10) Park, M.H.; Duan, X.; Ofir, Y.; Creran, B.; **Patra, D**.; Ling, Y. X.; Huskens, J.; Rotello, V. M. "Chemically Directed Immobilization of Nanoparticles onto Gold Substrates for Orthogonal Assembly Using Dithiocarbamate Bond Formaion" *ACS Appl. Mater. Interface,* **2010**, 2, 795-799.

(9) Subramani, C.; Ofir, Y.; **Patra, D.**; Jordan, B. J.; Moran, I. W.; Park, M.-H.; Carter, K. R.; Rotello, V. M. "Nanoimprinted Polyethyleneimine: A Multimodal Template for Nanoparticle Assembly and Immobilization" *Adv. Funct. Mater.*,**2009**, *19*, 2937 - 2942.

(8) **Patra, D.**; Pagliuca, C.; Subramani, C.; Samanta, B.; Agasti, S. S.; Zainalabdeen, N.; Caldwell, S. T.; Cooke, G.; Rotello, V. M. "Molecular Recognition at the Liquid–Liquid Interface of Colloidal Microcapsules" *Chem. Comm.* **2009**, *28*, 4248-4250.

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(7) **Patra, D.**; Ozdemir, F.; Miranda, O. R.; Samanta, B.; Sanyal, A.; Rotello, V. M. "Formation and Size Tuning of Colloidal Microcapsules via Host-Guest Molecular Recognition at the Liquid-Liquid Interface" *Langmuir*, **2009**, *25,* 13852–13854.
(6) Samanta,B.; Yang, X.-C.; Ofir, Y.; Park, M.-H.; **Patra, D.**; Agasti, S. S.; Miranda, O. R.; Mo, Z.-H.; Rotello, V. M. "Catalytic Microcapsules Assembled from Enzyme-Nanoparticle Conjugates at Oil-Water Interfaces" *Angew. Chem. Int. Ed.*, **2009**, *48*, 5341–5344.
(5) Samanta, B.; **Patra, D.**; Subramani, C.; Ofir, Y.; Yesilbag, G.; Sanyal, A.; Rotello, V.M. "Stable Magnetic Colloidosomes via "Click" Mediated Crosslinking of Nanoparticles at Water-oil Interfaces" *Small*, **2009**, *5*, 685-688.
(4) Samanta, B.; Ofir, Y.; **Patra, D.**; Rotello, V. M. "Self-assembly of Fluorocarbon-coated FePt Nanoparticles for Controlling Structure and Wettability of Surfaces" *Soft Matter*, **2009**, *5*, 1247–1250.
(3) Jordan, B. J.; Ofir, Y.; **Patra, D.;** Caldwell, S. T.; Kennedy, A.; Joubanian, S.; Rabani, G.; Cooke, G.; Rotello, V. M. "Controlled Self-Assembly of Organic Nanowires and Platelets Using Dipolar and Hydrogen-Bonding Interactions" *Small*, **2008**, *4*, 2074-2078.
(2) Arumugam, P.; **Patra, D.;** Samanta, B.; Agasti, S. S.; Subramani, C.; Rotello, V. M. "Self-Assembly and Cross-linking of FePt Nanoparticles at Planar and Colloidal Liquid-Liquid Interfaces" *J. Am. Chem. Soc.*, **2008**, *130*, 10046-10047.
(1) Xu, H.; Hong, R.; Wang, X.; Arvizo, R.; You, C-C; Samanta, B.; **Patra, D.;** Tuominen, M. T.; Rotello, V. M. "Controlled Formation of Patterned Gold Films via Site-Selective Deposition of Nanoparticles onto Polymer-Templated Surfaces" *Adv. Mater.,* **2007**, *19*, 1383-1386.

Technical Presentations (Selected)

Poster Presentation

(3) **Patra, D.***;* Samanta, B.; Arumugam, P.; Rotello, V. M. "Fabrication of Colloidal Microcapsules by Self-assembly and Crosslinking of Nanoparticles at Liquid-Liquid Interface" Research Fest, Department of Chemistry, Umass Amherst, MA, **2009**.
(2) **Patra, D.**; Samanta, B.; Arumugam, P.; Du, K.; Agasti, S.; Dinsmore, A.; Rotello, V. M. "Self-assembly of Nanoparticles at Liquid-Liquid Interfaces: A Strategy Toward Generating Stable Colloidosomes and Membranes" Abstracts of Papers, 236th ACS National Meeting, August 17-21, **2008,** Philadelphia, PA, United States.
(1) **Patra, D.**; Srivastava, S.; Lu, T.; Samanta, B.; Rotello, V. M. "Controlled Localization of FePt Nanoparticles in Block Copolymers for Modulation of Magnetic Properties" Abstracts of Papers, 234th ACS National Meeting, August 19-23, **2007**,Boston, MA, United States.

References

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