Stephen O'Brien
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Professor and researcher: materials science and engineering, chemistry, nanotechnology and energy

Experience: City College, City University of New York, Columbia University **New York, NY**

Principal Investigator, Energy Institute, City University of New York, *http://www.cuny.edu/site/energy.html*
Associate Professor, Department of Chemistry, The City College of New York, City University of New York.
Doctoral Faculty, Department of Chemical Engineering, Grove School of Engineering, City College New York.
Chair, Nanotechnology and Materials Discipline, Graduate Center, City University of New York.

2006- 2008: Associate Professor of Materials Science and Engineering, Columbia University.
2000- 2005: Assistant Professor, Department of Applied Physics, Columbia University.
2000- 2003: Institutional Guest Researcher, IBM, Yorktown Heights.

- Focus industries: Materials, clean technology, energy technology, power electronics, capacitors and transistors, LEDs, semiconductor electronics, chemicals, coatings, materials manufacturing.
- Experience in technology transfer, tech start-ups, intellectual property, financial structuring, small business innovation, consulting.
- Experience with investors, Angel, VC, corporate R&D, incubators, state and federal science and technology agencies: DOE, ARPA-e, NSF, NYSTAR, NYSERDA, foundations, national labs.
- Principal Investigator: Design and manage multi investigator research programs in energy research, nanoscale science and engineering. Build research teams, labs. Write proposals (government agencies, industry).
- Leader and advisor of research projects to a teams of faculty, PhDs and post-doctoral research scientists. Graduated six PhDs; managed four post docs; advised more than 20 masters/undergraduates.
- Published over 80 articles as lead author or co-author in peer reviewed American and international research journals, including Nature, Science.
- Research highlighted in *the economist*, Forbes, IBM Research news, Columbia news, National Science foundation Press releases and directorial speeches, Department of Energy reports.
- 6 pending patents filed with Columbia. Invented new methods for the preparation of electronic materials for the semiconductor industry. Applied nanotechnology to the development of nanotech medical diagnostics.
- Instrumental member of multi-$mm interdisciplinary research centers at Columbia, City College. Built teams with other principal investigators and researchers to address fundamental scientific problems in energy, nanoscience.
- Presentations in over 50 academic/industry/University conferences, many as invited guest speaker.
- Created, wrote and taught a range of practical and theoretical graduate/undergraduate courses in energy technology, nanotechnology, materials science and engineering.

Expansion Capital Partners

Clean tech Consultant/Analyst May-October 2008 **New York, NY**

- Deal flow creation and company sourcing over a range of sectors relevant to clean technology, including biofuels and biotech, materials and nanotech, recycling, solar/LED technology, polymers and fabrics.
- Drafted reports, conducted internal research for team briefings, reviewed financial models.
- Research and assessment for investment opportunities in nanotech/energy sectors. Industry research. Advise on strategies/perform diligence on new and existing ventures.

Lux Capital, Panorama Labs, SBA Materials, **New York, NY**

Technical Advisor/Consultant over period 2006-08

- Venture Capital Professor in Residence (Lux) and scientific consultant/advisor (Panorama, SBA). Research/assessment for opportunities in nanotech/energy sectors. Advise on strategies/perform diligence on new and existing ventures.

IBM TJ Watson Research Center **Yorktown Heights, NY**

- Collaborated with researchers and research managers in the physical sciences research division on projects related to IBM's core technology research and development.

Professional Preparation

Oxford University, Balliol College, D.Phil in Physical Sciences, 1998. **Oxford, United Kingdom**
Sussex University, B. S. (first class honors), May 1994. **Sussex, United Kingdom**

Additional

- Trained in Financial Modeling and Valuation (IB Institute); United States Permanent Resident (Greencard), U.K. citizenship; Full CV - Detailed list of honors/awards, publications, patents, conferences available upon request.

Stephen O'Brien

Associate Professor of Chemistry, City University of New York

Contact

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Websites

http://energy.cuny.edu/energy/faculty-research/sobrien.html
http://www.sci.ccny.cuny.edu/chemistry/faculty/obrien.html

Appointments

Principal Investigator, CUNY Energy Institute.
Associate Professor, Department of Chemistry, The City College of New York, City University of New York.
Doctoral Faculty, Department of Chemical Engineering, Grove School of Engineering, City College New York.
Sub-discipline Chair, Nanotechnology and Materials, Graduate Center, City University of New York.

2012: Visiting Fellow, Mechanical Engineering, Hong Kong University, Hong Kong.
2011: Visiting Scientist, Condensed Matter Physics and Materials Science, Brookhaven National Laboratory.
2006- 2008: Associate Professor of Materials Science and Engineering, Columbia University.
2000- 2005: Assistant Professor, Columbia University.
2000- 2003: Institutional Guest Member, IBM, Yorktown Heights.

Professional Preparation

1999-00: MRSEC Post-Doctoral Research Fellow in Materials Science, Columbia University and IBM TJ Watson Research Center (Advisors: Louis E. Brus and Christopher B. Murray)
1998-99: Post-Doctoral Research Fellow in Materials Chemistry, UC Santa Barbara. (Advisor: Galen Stucky)
1998: D. Phil. Physical Sciences, Inorganic Materials Chemistry, Balliol College, Oxford University, U.K. (Advisor: Dermot O'Hare)
1994: B.Sc. Chemistry (First Class Honors), Sussex University, U.K.

Disciplinary Fields

Materials science and engineering, inorganic chemistry, materials chemistry, applied physics, nanotechnology.

Research Grants

(1) ARPA-E (ADEPT – Metacapacitors, Project Manager, $1.8 MM)
(2) ARPA-E (GRIDS – Flow assisted Zn-Mn Battery Technology co-PI, $3MM)
(3) NSF ENG (Interdisciplinary Research in Nanodieletrics, co-PI $.5MM)
(4) NYSERDA (Battery and Energy Storage Technology, Project Manager $0.2MM)
(5) NSF CREST – Center for Exploitation of Nanostructures in Sensors and Energy Systems (co-PI)
(6) NSF MIRT - Building Functional Architectures in van der Waals Materials (co-PI)
(7) DOE NETL/CUNY Energy Storage Research Project (co-PI)

Previous:
2009: Columbia University Science and Technology Ventures: Commercialization Strategy for High Dielectric Constant Thin Film Devices ($100k, PI).
2003-08: NSF-CAREER: Transition Metal Oxide Nanocrystals and Composite Nanostructures ($400k, PI)
2003-06, 2006-09: DOE Controlling Structural, Electronic and Energy Flow Dynamics of Catalytic Processes Through Tailored Nanostructures. ($1.7m, renewal 06-09: $2.1m, 4 PIs, coPI)
2000-04, 2005-08: Columbia NSF MRSEC- Materials Research Science and Engineering Center "Center for Nanostructured Materials" ($7m, and NYSTAR funding, successful renewal, coPI
2001-05, 2005-2010: Columbia NSF NSEC– Nanoscale Science and Engineering Center. "Center for Electron Transport in Molecular Nanostructures" ($10.8m / 5 yrs, and NYSTAR funding successful renewal, 20 PIs, coPI)

2005-09 NIRT/SNB: "Combined Optical, Electrical, Mechanical, and Thermal Characterization of Individual Nanotubes" ($1.3m, coPI)
2004-05 Semiconductor Research Corp. (CSR) NV Memory from Nanocrystal Thin Films ($40k, coPI)

Other Professional

2008: Technology Consultant, Expansion Capital Partners, New York.
2007: Professor in Residence, Lux Capital Partners, New York.
2007: Visiting Fellow Nanyang Technological University, Singapore.
2006: Advisory Board Member, Panorama Labs (now Photonica), Rockefeller Center, New York.
2004-7: NSF Review Panel member, DMR and SBIR divisions.

Honors and Awards

2005: Undergraduate Research Symposium Award, New York Chapter, American Chemical Society.
2003: NSF CAREER: Transition Metal Oxide Nanocrystals and Composite Nanostructures.
1998: Post-Doctoral: Lindemann Trust Fellowship in the physical sciences, UC Santa Barbara.
1995: Graduate: Sasakawa and EPSRC research Awards, Waseda University, Tokyo.

Research Interests

Applications of nanomaterials and nanocomposites to cleantechnology, energy storage and power conversion. Capacitors and gate dielectrics. Nanomaterials synthesis, properties and structural characterization. Electronic devices from nanomaterials. Device performance and testing. Chemical deposition techniques and self-assembly. Printing and spin coated films. Two dimensional nanomaterials and electronics, graphene, boron nitride. Nanoparticle synthesis and self-assembly into superlattices. Transition metal oxide nanomaterials, high k dielectrics/memory materials. Titanates and garnets at the nanoscale, multi-ferroics, magneto-optical materials, photonic materials, metamaterials. Catalysis and nanomaterials, carbon nanotubes. Biological applications of nanoparticles/nanotubes.

Teaching and University

Spring 2012: Introduction to Nanotechnology (CHEM 78500) PhD Level Course
Spring 2011: Modern Materials Science (CHEM B8004), Masters/Graduate Level Course mainly for engineers.
Fall 2009-10, 12: General Chemistry (CHEM 103). Introductory level course for Freshman at CCNY (144 Students).

2006-08: Fall, APPH/MSAE E4090 Nanotechnology; Spring: MSAE E3142 "Processing of Ceramics and Polymers"
2006-7: MSAE 3104 "Materials Science Laboratory"
2005-06: Fall, APPH/MSAE E6090 Nanotechnology; Spring: MSAE E3142 "Processing of Ceramics and Polymers", MSAE 3104 "Materials Science Laboratory"
2004-05: Fall, E3103 Elements of Materials Science; Spring: MSAE E4132 "Fundamentals of Ceramics and Polymers", MSAE 3104 "Materials Science Laboratory",
2003-04 Fall: APPH/MSAE E6090 "Nanotechnology", Spring: MSAE E4132 "Fundamentals of Ceramics and Polymers"; MSAE 3104 "Materials Science Laboratory"
2002-03: Fall: MSAE E6090 "Nanotechnology"; Spring: MSAE E3142 "Processing of Ceramics and Polymers"; MSAE 3104 "Materials Science Laboratory"
2001-02: MSAE E4250 "Ceramics"; MSAE E3142 "Processing of Ceramics and Polymers", MSAE 3104 "Materials Science Laboratory".

Created, wrote and taught several courses in materials science and nanotechnology at the graduate level and senior/masters level. Courses for engineers (Chem E, EE, Mech E) and scientists (Phys, Chem)
Taught multiple courses to undergraduates majoring in Materials Science and Engineering and Chemistry.
Research courses for Undergraduates/Graduates: 2001-07: MSAE E3156 "Design Project", MSAE E3900 "Research for Undergraduates", MSAE E4301 'Materials Science Lab", MSAE E6273 "Research Reports", APAM E6650 'Research Project", MSAE E9301, MSAE E9309, and MSAE E9900, "Doctoral Research".

Department: Graduate Student Advisor, Admissions Committee member, MSE Undergraduate Advisor, Served on over 20 defense committees.
University: Elected member of University Senate (2003-05), including Senate Executive Committee.

Collaborators and Affiliations

Collaborators within the last 48 months: Professor Dan Akins (City College New York), Professor Sanjoy Banerjee (City College New York), Professor Louis Brus (Columbia University), Professor Alex Couzis (City College New York), Professor Tony Heinz (Columbia University), Professor Irving Herman (Columbia University), Professor James Hone (Columbia University), Professor Philip Kim (Columbia University), Professor Peter Kinget (Columbia University), Professor Ilona Kretschmar (City College New York), Professor Ioannis Kymissis (Columbia University), Professor Lia Krusin (Physics, CCNY), Professor Charles Michael Drain (Hunter College), Professor Diandra Leslie-Pelecky (WVU), Professor Jackie Li (City Collge New York), Professor John Lombardi (City College New York), Professor Alan Lyons (CSI), Professor Hiroshi Matsui (Hunter College CUNY), Professor Colin Nuckolls (Columbia University), Professor Seth Sanders (UC Berkeley), Professor AK Soh (Hong Kong University), Professor Talat Rahman (Florida State University), Professor Dan Steingart (City College New York), Professor Nicholas Turro (Columbia University), Professor Chee Wei Wong (Columbia University).

Graduate and Post-Doctoral Researchers

Dr. Eli Leland (Research Associate); Shuangyi Liu (post-doc); Andrew Byro (4rd yr PhD); Benedette Adawale (MS); Xiaohua Liu (3rd yr PhD); Wanlu Li (2nd year PhD)

Former Post Docs: Dr. Limin Huang, Dr. Chenguang Lu, Dr. Franz Redl, Dr. Elena Shevchenko
Former graduate Students: Zhuoying Chen (PhD), Zhang Jia (PhD), Teresa Fazio (PhD), Dr. Tamar Andelman, Dr. Kristi Hultman, Dr. Ming Yin, Dr. Stephanie Grancharov, Dr. Amanda Willis, Dr. Brian White.

Masters Students and Undergraduate Researchers

Vincent Chiang, Jennifer Lin, Chih-Chen Wang, Brian Deegan, Mark Polking, Brian Ruby, Adrian Podpirka, James Wilson, Martin Alvarez, Ben Jennings, Andrew Thiel, Jarod Were.

Professional Society Memberships

Materials Research Society (MRS), Institute of Electrical and Electronics Engineers (IEEE), American Chemical Society (ACS), American Ceramic Society (AcerS), American Association for the Advancement of Science (AAAS), American Physical Society (APS).

Selected Conference Presentations

1. Nanocrystal Capacitors: Design, Scaling, Film Fabrication and Testing, and Applications in DC-DC Power Conversion, University of Florida, February, 2013. (*invited*)
2. 2013 Power Society Meeting, IEEE, San Fransisco, November 16-18, 2012. *Session Chair*
3. "Applying Nanotechnology to Energy Technology", CUNY Workshop on Nanotechnology, New York, November, 2012. (*invited*)
4. "Nanodielectric materials", Hong Kong University, July 2012. (*invited*)
5. "Metacapacitors: Printed, Low-Cost Capacitors for Electric Power Conversion", ARPA-e Energy Innovation Summit, Awardee presentation and demonstration booth, February, 2012 (*invited*)
6. "Nanoparticle Synthesis and Processing Issues" AIChE Chem Show - Nanotechnology 2011 Workshop, November, 2011 (*invited*)
7. 'Metacapacitors: Innovation In Core Technologies for Power Conversion and Energy Storage" New York Battery and Energy Storage Technology Consortium (BEST) Meeting, March 2011 (*invited*)
8. "Metacapacitors: Printed, Low-Cost Capacitors for Electric Power Conversion", ARPA-e Energy Innovation Summit, Awardee presentation and booth, February, 2011 (*invited*)
9. "Optimization of Nanodielectrics for Energy Storage Applications", NSF-CMMI, January 2011, Atlanta, GA.
10. "Nanocrystals and Superlattices", Department of Physics, City College New York, 2010 (*invited*)
11. "Nanocrystals and Superlattices", University of New Orleans, November 2009 *(invited)*.
12. "Structure Direction of II-VI Semiconductor Quantum Dot Binary Nanoparticle Superlattices", MRS Spring 2009, San Francisco (*invited*).
13. "Chemical Approaches to Nanomaterials" Department of Chemistry and Department of Chemical Engineering (Grove School of Engineering), City College New York, Spring 2009. (*invited*).
14. "Nanocrystals, Synthesis, Self Assembly and Applications", GE Global Research Center, Niskayuna, April 2008 (*invited*).
15. "Nanocrystals, Synthesis, Self Assembly and Applications", UT Dallas, Dallas, March 2008 (*invited*).

16. "Nanocrystals, Synthesis, Superlattices and Biomedical Applications", Hunter College, City University of New York, Feb. 2008 (*invited*)
17. "Nanocrystals prepared by Modern Materials Chemistry Methods", Brookhaven Center for Functional Nanomaterials, Jan. 2008 (*invited*)
18. "Nanocrystals, Synthesis, Superlattices and Biomedical Applications", Rutgers University, New Brunswick, Jan 2008. (*invited*)
19. "Nanocrystals and Nanocrystal Superlattices" and "Immunotargeted Superparamagnetic Iron Oxide Nanoparticles" MRS Fall Dec. 2007.
20. "Nanocrystal Synthesis and Nanocrystal Superlattices", University of Madison, Wisconsin, Nov. 2007 (*invited*)
21. "Scale your Enthusiasm", New York University, NYNDG, Oct. 2007(*invited*)
22. "Nanocrystal Synthesis and Nanocrystal Superlattices" NSF Workshop: Periodic Patterns, Relationships and Categories of Well-Defined Nanoscale Building Blocks, Central Michigan University, MI, September 2007 (*invited speaker and panel member)*
23. "Nanocrystal Synthesis and Nanocrystal Superlattices", Imperial College, London, Sept. 2007. (*invited*)
24. "Monodisperse Magnetic Nanoparticles for Specific Antibody Targeted MRI Contrast Imaging", and "Nanocrystal Synthesis and Nanocrystal Superlattices" July 2007, ICMAT '07, Singapore. (*both invited*)
25. "Nanocrystals. Synthesis, Superlattices and Biomedical Applications", Duke University, May 2007. (*invited*)
26. "Nanocrystal Superlattices", Cambridge University Cavendish Laboratories, April 2007. (*invited*)
27. "Nanoparticles: New Opportunities and Challenges for Colloid Scientists", Royal Society of Chemistry Conference on Colloids, University of Warwick, United Kingdom, March 2007. (*Keynote)*
28. "Nanostructured Materials: Synthesis, Strategy and Self-Assembly", Nanyang Technological University, Nov 2006. (*invited)*
29. "Nanostructured Materials: Synthesis, Strategy and Self-Assembly", 50th IUVSTA Workshop, Dubrovnik,
30. October 2006. (*invited)*
31. "Nanoscale materials and self-assembly" Tokyo University, July 2006. (*invited*)
32. "Scale your Enthusiasm", MARM, Regional American Chemical Society Meeting on Solid State Chemistry, June 2006. (*invited)*
33. "Functional Oxide Nanostructures and Bimodal Superlattices", MRS Spring, San Francisco April 2006 (*invited*)
34. 29, 30, & 31. 'Scale your Enthusiasm", Brown University, Rutgers University, and University of Nebraska, October and November, 2005 (*invited talks*).
35. 32. 'Monodisperse Magnetic Nanoparticles. Biological applications in detection and contrast enhancement", September 2005, New York University/MICA.
36. 33. 'Scale your Enthusiasm" The New York Chemistry Students' Association 53rd Annual Undergraduate Research Symposium. Stonybrook, May 2005. (*Keynote Speaker*)
37. 34. 'Scale your Enthusiasm", Kansas State University, Department of Physics, April 2005. (*invited*)
38. 35. "Transition Metal Oxide Nanocrystals and Bimodal Nanocrystal Superlattices." MRS Meeting, San Francisco. March, 2005. (*Invited)*
39. 36. "Multicomponent Assembly of Nanocrystals", SPIE Meeting, Denver, 2004. *(Invited)*
40. 37. 'Self Assembly of Magnetic and Semiconducting Nanocrystals", QD2004, Quantum Dots Conference, May 2004.
41. 38. "Strategy and Synthesis of Transition Metal Oxide Nanocrystals", American Chemical Society, Anaheim, March 2004. *(Invited)*
42. 39. "Synthesis and Properties of Transition Metal Oxide Nanocrystals", Louisiana State University, Nanotech Conference, February, 2004. *(Invited)*
43. 40. "Nanocrystals as artificial atoms in the assembly of multicomponent systems that mimic Zintl phases: Three-dimensional binary superlattices of magnetic nanocrystals and semiconductor quantum dots", American Chemical Society, New York, Sept. 2003. *(Invited)*
44. 41. "The synthesis, characterization and properties of transition metal oxide nanocrystal and nanocrystal composite systems," American Chemical Society, New York, Sept. 2003.
45. 42. "Controlled Growth of Oriented Single Walled Carbon Nanotubes from Mesoporous Silica", Materials Research Society, San Francisco, April, 2003.
46. 43. "A Chemical Perspective to Strategy and Design of Nanoscale Materials", 17th Annual National Educators Workshop, San Hose, October 2002. (*Invited*)
47. 44. "The Synthesis, Characterization and Properties of Oxide Nanoparticle and Nanoparticle Composite Systems", Ninth International Conference on Composites Engineering, San Diego, August, 2002. (*Invited*)

48. 45. "Oxide Nanoparticles: Synthesis Strategy and Size Dependent Properties" Gordon Research Conference on Nanostructures, New London, CT, July 2001. *(Invited)*
50. 46. "Monodisperse Oxide Nanoparticles with Applications in Ferroelectrics"American Ceramic Society 103rd Meeting, Indianapolis, April 2001. *(Invited)*

Other Meetings and Conference Presentations:
2003-08: O'Brien group researchers have presented over 40 talks and posters at peer reviewed international meetings, including MRS Spring and MRS Fall, ACS National meetings.

Patents

1. Pub. No.: WO/2004/060580 International Application No.: PCT/US2002/040550: "Method of preparation of biomagnetic nanoparticles coated with a noble metal layer."
[http://www.wipo.int/pctdb/en/wo.jsp?wo=2004060580]
2. Pub. No.: WO/2005/060610 International Application No.: PCT/US2004/041141: "Nano-sized particles, processes of making, compositions and uses thereof."
[http://www.wipo.int/pctdb/en/wo.jsp?wo=2005060610]
3. Pub. No.: WO/2006/004599 International Application No.: PCT/US2005/019441: "Methods for Preparing Single Walled Carbon Nanotubes."
4. US 2007/0059775: "Synthesis and Conjugation of Iron Oxide Nanoparticles to Antibodies for Targeting Specific Cells using Fluorescence and MR Imaging Techniques."
5. Pub. No.: WO/2007/117503 International Application No.: PCT/US2007/008389: "Preparing Nanoparticles and Carbon Nanotubes."
6. Pub. No.: WO/2007/136488 International Application No.: PCT/US2007/009637: "Copper Oxide Nanoparticle System."
7. Pub. No. WO/2008/118422 International Application No.: PCT/US2008/003878: "Metal Oxide Nanocrystals: Preparation and Uses."
8. "Barium Titanate Nanocrystal Applications" (provisional filing, M06-091: US 11/982,842, SLW2413.049wo1.

Selected Media Articles and Press Releases

http://www.ny-best.org/page/2011-ny-best-conference-proceedings
http://www.cuny.edu/site/energy.html
http://www1.cuny.edu/mu/energy-news/2010/12/16/energy-department-awards-cuny-energy-institute-4-6-million/
http://www.molecularstation.com/science-news/2010/09/energy-department-awards-cuny-energy-institute-4-6-million/

Amato, I. "Feature Article: A Periodic Table of Nanoparticles" Chemical and Engineering News 2006, 84, 45-46. http://pubs.acs.org/cen/science/84/8434sci1.html

"Stephen O'Brien, Renowned Nanotech Expert, Joins Panorama Labs Advisory Board." http://www.nsti.org/press/PRshow.html?id=1743

Columbia news: "Groundbreaking Research on Molecular Electronics Reported in Journal *Science*", Jan 20, 2006, http://www.columbia.edu/cu/news/06/01/nanotubes.html

Columbia news: "New Nanotechnological Structures Reported for the First Time in Journal *Nature*", Jan 06, 2006, http://www.columbia.edu/cu/news/06/01/superlattice.html

National Science Foundation: "A New Family of Self-Assembling Nanolattices", January 5, 2006 http://www.nsf.gov/news/news_summ.jsp?cntn_id=105690&org=NSF

Columbia news: "Magnetic and Semiconducting Nanocrystals Can Self-Assemble, Says Stephen O'Brien", Jan 28, 2004, http://www.columbia.edu/cu/news/media/03/steveObrien/index.html.

IBM Research News: "Scientists announce first 3D assembly of magnetic and semiconducting particles", June 25, 2003.

The Economist: "Nanomaterials move up a notch", Technology Quarterly, September 6, v. 368, no. 8340, 2003.

Forbes: "Top Five Nanotech Breakthroughs of 2003", www.forbes.com/technology, March, 2004.

Publications and Articles

1. Liu, S.; L.; Huang, L.; Li J.; O'Brien, S., "Intrinsic dielectric frequency dependent spectrum of a single domain tetragonal $BaTiO_3$" *Journal of Applied Physics* 112, 014108 (2012); http://dx.doi.org/10.1063/1.4734004.

2. Liu, S.; Zhang, H.; Lev Sviridov, L.; Huang, L.; Xiaohua Liu, X.; Jacopo Samson, J.; Akins, D. L.; Li J.; O'Brien, S. "Comprehensive Dielectric Performance of Bismuth Acceptor Doped $BaTiO_3$ Based Nanocrystal Thin Film Capacitors" *Journal of Materials Chemistry*, **2012**, 22, 21862-21870, DOI: 10.1039/C2JM34044E

3. Yang, S.; Tull, B. R.; Pervez, N. K.; Huang, L.; Leland, E. S.; Steigart, D. A.; O'Brien, S.; Kymissis, I. "Asymmetric Leakage in (Ba, Sr)TiO_3 Nanoparticle/Parylene-C Composite Capacitors", *Journal of Polymer Science B: Polymer Physics*, (2012) DOI: 10.1002/polb.23156.

4. Roussel, F.; Brun, J.-F., Alexandre Allart, A.; Huang, L.; O'Brien, S. "Horizontally-aligned carbon nanotubes arrays and their interactions with liquid crystal molecules: Physical characteristics and display applications." *AIP Advances* 2, **2012**, 012110.

5. Nguyen-Thanh, D.; Frenkel, A. I.; Wang, J.; O'Brien, S.; Akins, D. L. "Cobalt-Polypyrrole-Carbon Black (Co-PPY-CB) "Electrocatalysts for the Oxygen Reduction Reaction (ORR) in Fuel Cells: Composition and Kinetic Activity" *Applied Catalysis B: Environmental*, 105, 50-60, **2011**.

6. O'Brien, S. "High K Capacitors and OFET Gate Dielectrics from Self-Assembled BaTiO3 and (Ba,Sr) TiO3 Nanocrystals in the Superparaelectric Limit – On the Superparaelectric State in BaTiO3 Nanocrystals", *Advanced Functional Materials*, Materials Views (Comment) Volume 21, Issue 17, pages 3212–3213, September 9, 2011.

7. Huang, L.; Zhang, J.; Kymissis, I.; O'Brien, S. "High K thin films built from uniform Barium Titanate Nanocrystals in the Superparaelectric Limit" *Adv. Func. Mater.* **2010**, 20, 554-560.

8. Zhang, L.; Huang, L.; Lind, M.; Liao, V.; O'Brien, S; and Yu, Z., "Excitation, Temperature, and Structural Dependence of Second-Order Raman Modes in Single-Wall Carbon Nanotubes", *J. Phys. Chem. C*, **2009**, 113 (37), 16432–16438.

9. Chen, Z. and O'Brien, S. "Structure Direction of II-IV Semiconductor Quantum Dot Superlattices by Tuning Radius ratio", *ACS Nano*, **2008**, 2(6), 1219-1229.

10. Hultman, K. L.; Raffo, A. J.; Grzenda, A. L.; Harris, P. E.; Brown, T. R.; and O'Brien, S "Immunotargeted Superparamagnetic Iron Oxide Nanoparticles" *ACS Nano*, **2008**, 2(3), 477–484.

11. Lu, C.; Chen, Z. and O'Brien, S. "Optimized Conditions for the Self-Organization of CdSe-Au Binary Nanoparticle Superlattices" *Chemistry of Materials*, **2008**, 20(11), 3594-3600.

12. Wu, C.-K.; Hultman, K. L.; O'Brien, S.; Koberstein, J. T. "Functional Oligomers for the Control and Fixation of Spatial Organization in Nanoparticle Assemblies." *Journal of the American Chemical Society*, **2008**, 130(11), 3516-3520.

13. Zhang, L; Huang, L.; O'Brien, S.; and Yu, Z."Electrostatic Doping-induced Phonon Shift of Metallic Single-Wall Carbon Nanotubes." J. Phys. Chem. C **2008**, 112, 20118.

14. Li Zhang, Zhang Jia, Limin Huang, Stephen O'Brien, and Zhonghua Yu, "Low Temperature Raman Spectroscopy of Individual Single-Wall Carbon Nanotubes and Single-Layer Graphene." J. Phys. Chem. C **2008**, 112, 13893.

15. Yang Wu, Mingyuan Huang, Feng Wang, X. M. Henry Huang, Sami Rosenblatt, Limin Huang, Hugen Yan, Stephen P. O'Brien, James Hone, and Tony F. Heinz, "Determination of the Young's Modulus of Structurally Defined Carbon Nanotubes," *Nano Lett.*, **2008**, 8, 4158-4161.

16. Chen, Z.; Moore, J.; Radtke, G.; Sirringhaus, H and O'Brien, S "Binary Nanoparticle Superlattices in the Semiconductor-Semiconductor System: CdTe and CdSe" *Journal of the American Chemical Society* **2007**, 129(50); 15702-15709.

17. Yin, M.; Chen, Z.; Deegan, B.; O'Brien, S. "Wustite Nanocrystals: Synthesis, Structure and Superlattice Formation" *Journal of Materials Research* **2007**, *vol.22*, 7, 1987-1995.

18. Willis, A. L.; Chen, Z.; He, J.; Zhu, Y.; Turro, N. J.; O'Brien, S. "Metal acetylacetonates as general precursors for the synthesis of early transition metal oxide nanomaterials" *Journal of Nanomaterials*, **2007**, doi:10.1155/2007/14858.

19. Zhang, L.; Zhang, J.; Huang, L.; O'Brien, S.; Yu, Z." Imaging and Raman Spectroscopy of Individual Single-Wall Carbon Nanotubes on a Large Substrate" *Journal of Physical Chemistry B* **2007**, 111(30);11240-11245.

20. Funk, S.; Burghaus, U.; White, B.; O'Brien, S.; Turro, N. J. "Adsorption Dynamics of Alkanes on Single-Wall Carbon Nanotubes: A Molecular Beam Scattering Study", *Journal of Physical Chemistry C.*, **2007**, 111(22), 8043-8049.

21. White, B.; Banerjee, S.; O'Brien, S.; Turro, N. J.; Herman, I. P. "Zeta Potential Measurements of Surfactant-Wrapped Individual Single-Walled Carbon Nanotubes" **2007**, 111(37); 13684-13690.

22. Morales, M. A.; Skomski, R.; Fritz, S.; Shelburne, G.; Shiled, J. E.; Yin, M.; O'Brien, S.; Leslie-Pelecky, D. L. "Surface Anisotropy and Magnetic Freezing of MnO Nanoparticles" *Physical Review B* **2007**, 75, 134423.

23. Huang, L.; Jia, Z.; O'Brien, S. "Oriented Assembly of Single-Walled Carbon Nanotubes and Applications (Invited Review Article)" *Journal of Materials Chemistry* **2007**, 17, 3863 – 3874.

24. Gong, Y.; Andelman, T.; G. F. Neumark, G. F.; O'Brien, S.; Kuskovsky, I. L. "Origin of defect-related green emission from ZnO nanoparticles: effect of surface modification," *Nanoscale Res. Lett.* **2007**, 2, 297.

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(2) ARPA-E (GRIDS – Flow assisted Zn-Mn Battery Technology co-PI, $3MM)
(3) NSF ENG (Interdisciplinary Research in Nanodieletrics, co-PI $.5MM)
(4) NYSERDA (Battery and Energy Storage Technology, Project Manager $0.2MM)
(5) NSF CREST – Center for Exploitation of Nanostructures in Sensors and Energy Systems (co-PI)
(6) NSF MIRT - Building Functional Architectures in van der Waals Materials (co-PI)
(7) DOE NETL/CUNY Energy Storage Research Project (co-PI)

Previous:
2009: Columbia University Science and Technology Ventures: Commercialization Strategy for High Dielectric Constant Thin Film Devices ($100k, PI).
2003-08: NSF-CAREER: Transition Metal Oxide Nanocrystals and Composite Nanostructures ($400k, PI)
2003-06, 2006-09: DOE Controlling Structural, Electronic and Energy Flow Dynamics of Catalytic Processes Through Tailored Nanostructures. ($1.7m, renewal 06-09: $2.1m, 4 PIs, coPI)
2000-04, 2005-08: Columbia NSF MRSEC- Materials Research Science and Engineering Center "Center for Nanostructured Materials" ($7m, and NYSTAR funding, successful renewal, coPI
2001-05, 2005-2010: Columbia NSF NSEC– Nanoscale Science and Engineering Center. "Center for Electron Transport in Molecular Nanostructures" ($10.8m / 5 yrs, and NYSTAR funding successful renewal, 20 PIs, coPI)

2005-09 NIRT/SNB: "Combined Optical, Electrical, Mechanical, and Thermal Characterization of Individual Nanotubes" ($1.3m, coPI)
2004-05 Semiconductor Research Corp. (CSR) NV Memory from Nanocrystal Thin Films ($40k, coPI)

Other Professional

2008: Technology Consultant, Expansion Capital Partners, New York.
2007: Professor in Residence, Lux Capital Partners, New York.
2007: Visiting Fellow Nanyang Technological University, Singapore.
2006: Advisory Board Member, Panorama Labs (now Photonica), Rockefeller Center, New York.
2004-7: NSF Review Panel member, DMR and SBIR divisions.

Honors and Awards

2005: Undergraduate Research Symposium Award, New York Chapter, American Chemical Society.
2003: NSF CAREER: Transition Metal Oxide Nanocrystals and Composite Nanostructures.
1998: Post-Doctoral: Lindemann Trust Fellowship in the physical sciences, UC Santa Barbara.
1995: Graduate: Sasakawa and EPSRC research Awards, Waseda University, Tokyo.

Research Interests

Applications of nanomaterials and nanocomposites to cleantechnology, energy storage and power conversion. Capacitors and gate dielectrics. Nanomaterials synthesis, properties and structural characterization. Electronic devices from nanomaterials. Device performance and testing. Chemical deposition techniques and self-assembly. Printing and spin coated films. Two dimensional nanomaterials and electronics, graphene, boron nitride. Nanoparticle synthesis and self-assembly into superlattices. Transition metal oxide nanomaterials, high k dielectrics/memory materials. Titanates and garnets at the nanoscale, multi-ferroics, magneto-optical materials, photonic materials, metamaterials. Catalysis and nanomaterials, carbon nanotubes. Biological applications of nanoparticles/nanotubes.

Teaching and University

Spring 2012: Introduction to Nanotechnology (CHEM 78500) PhD Level Course
Spring 2011: Modern Materials Science (CHEM B8004), Masters/Graduate Level Course mainly for engineers.
Fall 2009-10, 12: General Chemistry (CHEM 103). Introductory level course for Freshman at CCNY (144 Students).

2006-08: Fall, APPH/MSAE E4090 Nanotechnology; Spring: MSAE E3142 "Processing of Ceramics and Polymers"
2006-7: MSAE 3104 "Materials Science Laboratory"
2005-06: Fall, APPH/MSAE E6090 Nanotechnology; Spring: MSAE E3142 "Processing of Ceramics and Polymers", MSAE 3104 "Materials Science Laboratory"
2004-05: Fall, E3103 Elements of Materials Science; Spring: MSAE E4132 "Fundamentals of Ceramics and Polymers", MSAE 3104 "Materials Science Laboratory",
2003-04 Fall: APPH/MSAE E6090 "Nanotechnology", Spring: MSAE E4132 "Fundamentals of Ceramics and Polymers"; MSAE 3104 "Materials Science Laboratory"
2002-03: Fall: MSAE E6090 "Nanotechnology"; Spring: MSAE E3142 "Processing of Ceramics and Polymers"; MSAE 3104 "Materials Science Laboratory"
2001-02: MSAE E4250 "Ceramics"; MSAE E3142 "Processing of Ceramics and Polymers", MSAE 3104 "Materials Science Laboratory".

Created, wrote and taught several courses in materials science and nanotechnology at the graduate level and senior/masters level. Courses for engineers (Chem E, EE, Mech E) and scientists (Phys, Chem)
Taught multiple courses to undergraduates majoring in Materials Science and Engineering and Chemistry.
Research courses for Undergraduates/Graduates: 2001-07: MSAE E3156 "Design Project", MSAE E3900 "Research for Undergraduates", MSAE E4301 'Materials Science Lab", MSAE E6273 "Research Reports", APAM E6650 'Research Project", MSAE E9301, MSAE E9309, and MSAE E9900, "Doctoral Research".

Department: Graduate Student Advisor, Admissions Committee member, MSE Undergraduate Advisor, Served on over 20 defense committees.
University: Elected member of University Senate (2003-05), including Senate Executive Committee.

Collaborators and Affiliations

Collaborators within the last 48 months: Professor Dan Akins (City College New York), Professor Sanjoy Banerjee (City College New York), Professor Louis Brus (Columbia University), Professor Alex Couzis (City College New York), Professor Tony Heinz (Columbia University), Professor Irving Herman (Columbia University), Professor James Hone (Columbia University), Professor Philip Kim (Columbia University), Professor Peter Kinget (Columbia University), Professor Ilona Kretschmar (City College New York), Professor Ioannis Kymissis (Columbia University), Professor Lia Krusin (Physics, CCNY), Professor Charles Michael Drain (Hunter College), Professor Diandra Leslie-Pelecky (WVU), Professor Jackie Li (City Collge New York), Professor John Lombardi (City College New York), Professor Alan Lyons (CSI), Professor Hiroshi Matsui (Hunter College CUNY), Professor Colin Nuckolls (Columbia University), Professor Seth Sanders (UC Berkeley), Professor AK Soh (Hong Kong University), Professor Talat Rahman (Florida State University), Professor Dan Steingart (City College New York), Professor Nicholas Turro (Columbia University), Professor Chee Wei Wong (Columbia University).

Graduate and Post-Doctoral Researchers

Dr. Eli Leland (Research Associate); Shuangyi Liu (post-doc); Andrew Byro (4rd yr PhD); Benedette Adawale (MS); Xiaohua Liu (3rd yr PhD); Wanlu Li (2nd year PhD)

Former Post Docs: Dr. Limin Huang, Dr. Chenguang Lu, Dr. Franz Redl, Dr. Elena Shevchenko
Former graduate Students: Zhuoying Chen (PhD), Zhang Jia (PhD), Teresa Fazio (PhD), Dr. Tamar Andelman, Dr. Kristi Hultman, Dr. Ming Yin, Dr. Stephanie Grancharov, Dr. Amanda Willis, Dr. Brian White.

Masters Students and Undergraduate Researchers

Vincent Chiang, Jennifer Lin, Chih-Chen Wang, Brian Deegan, Mark Polking, Brian Ruby, Adrian Podpirka, James Wilson, Martin Alvarez, Ben Jennings, Andrew Thiel, Jarod Were.

Professional Society Memberships

Materials Research Society (MRS), Institute of Electrical and Electronics Engineers (IEEE), American Chemical Society (ACS), American Ceramic Society (AcerS), American Association for the Advancement of Science (AAAS), American Physical Society (APS).

Selected Conference Presentations

1. Nanocrystal Capacitors: Design, Scaling, Film Fabrication and Testing, and Applications in DC-DC Power Conversion, University of Florida, February, 2013. (*invited*)
2. 2013 Power Society Meeting, IEEE, San Fransisco, November 16-18, 2012. *Session Chair*
3. "Applying Nanotechnology to Energy Technology", CUNY Workshop on Nanotechnology, New York, November, 2012. (*invited*)
4. "Nanodielectric materials", Hong Kong University, July 2012. (*invited*)
5. "Metacapacitors: Printed, Low-Cost Capacitors for Electric Power Conversion", ARPA-e Energy Innovation Summit, Awardee presentation and demonstration booth, February, 2012 (*invited*)
6. "Nanoparticle Synthesis and Processing Issues" AIChE Chem Show - Nanotechnology 2011 Workshop, November, 2011 (*invited*)
7. 'Metacapacitors: Innovation In Core Technologies for Power Conversion and Energy Storage" New York Battery and Energy Storage Technology Consortium (BEST) Meeting, March 2011 (*invited*)
8. "Metacapacitors: Printed, Low-Cost Capacitors for Electric Power Conversion", ARPA-e Energy Innovation Summit, Awardee presentation and booth, February, 2011 (*invited*)
9. "Optimization of Nanodielectrics for Energy Storage Applications", NSF-CMMI, January 2011, Atlanta, GA.
10. "Nanocrystals and Superlattices", Department of Physics, City College New York, 2010 (*invited*)
11. "Nanocrystals and Superlattices", University of New Orleans, November 2009 *(invited)*.
12. "Structure Direction of II-VI Semiconductor Quantum Dot Binary Nanoparticle Superlattices", MRS Spring 2009, San Francisco (*invited*).
13. "Chemical Approaches to Nanomaterials" Department of Chemistry and Department of Chemical Engineering (Grove School of Engineering), City College New York, Spring 2009. (*invited*).
14. "Nanocrystals, Synthesis, Self Assembly and Applications", GE Global Research Center, Niskayuna, April 2008 (*invited*).
15. "Nanocrystals, Synthesis, Self Assembly and Applications", UT Dallas, Dallas, March 2008 (*invited*).

16. "Nanocrystals, Synthesis, Superlattices and Biomedical Applications", Hunter College, City University of New York, Feb. 2008 (*invited*)
17. "Nanocrystals prepared by Modern Materials Chemistry Methods", Brookhaven Center for Functional Nanomaterials, Jan. 2008 (*invited*)
18. "Nanocrystals, Synthesis, Superlattices and Biomedical Applications", Rutgers University, New Brunswick, Jan 2008. (*invited*)
19. "Nanocrystals and Nanocrystal Superlattices" and "Immunotargeted Superparamagnetic Iron Oxide Nanoparticles" MRS Fall Dec. 2007.
20. "Nanocrystal Synthesis and Nanocrystal Superlattices", University of Madison, Wisconsin, Nov. 2007 (*invited*)
21. "Scale your Enthusiasm", New York University, NYNDG, Oct. 2007(*invited*)
22. "Nanocrystal Synthesis and Nanocrystal Superlattices" NSF Workshop: Periodic Patterns, Relationships and Categories of Well-Defined Nanoscale Building Blocks, Central Michigan University, MI, September 2007 (*invited speaker and panel member)*
23. "Nanocrystal Synthesis and Nanocrystal Superlattices", Imperial College, London, Sept. 2007. (*invited*)
24. "Monodisperse Magnetic Nanoparticles for Specific Antibody Targeted MRI Contrast Imaging", and "Nanocrystal Synthesis and Nanocrystal Superlattices" July 2007, ICMAT '07, Singapore. (*both invited*)
25. "Nanocrystals. Synthesis, Superlattices and Biomedical Applications", Duke University, May 2007. (*invited*)
26. "Nanocrystal Superlattices", Cambridge University Cavendish Laboratories, April 2007. (*invited*)
27. "Nanoparticles: New Opportunities and Challenges for Colloid Scientists", Royal Society of Chemistry Conference on Colloids, University of Warwick, United Kingdom, March 2007. (*Keynote)*
28. "Nanostructured Materials: Synthesis, Strategy and Self-Assembly", Nanyang Technological University, Nov 2006. (*invited)*
29. "Nanostructured Materials: Synthesis, Strategy and Self-Assembly", 50th IUVSTA Workshop, Dubrovnik,
30. October 2006. (*invited)*
31. "Nanoscale materials and self-assembly" Tokyo University, July 2006. (*invited*)
32. "Scale your Enthusiasm", MARM, Regional American Chemical Society Meeting on Solid State Chemistry, June 2006. (*invited)*
33. "Functional Oxide Nanostructures and Bimodal Superlattices", MRS Spring, San Francisco April 2006 (*invited*)
34. 29, 30, & 31. 'Scale your Enthusiasm", Brown University, Rutgers University, and University of Nebraska, October and November, 2005 (*invited talks*).
35. 32. 'Monodisperse Magnetic Nanoparticles. Biological applications in detection and contrast enhancement", September 2005, New York University/MICA.
36. 33. 'Scale your Enthusiasm" The New York Chemistry Students' Association 53rd Annual Undergraduate Research Symposium. Stonybrook, May 2005. (*Keynote Speaker*)
37. 34. 'Scale your Enthusiasm", Kansas State University, Department of Physics, April 2005. (*invited*)
38. 35. "Transition Metal Oxide Nanocrystals and Bimodal Nanocrystal Superlattices." MRS Meeting, San Francisco. March, 2005. (*Invited)*
39. 36. "Multicomponent Assembly of Nanocrystals", SPIE Meeting, Denver, 2004. *(Invited)*
40. 37. 'Self Assembly of Magnetic and Semiconducting Nanocrystals", QD2004, Quantum Dots Conference, May 2004.
41. 38. "Strategy and Synthesis of Transition Metal Oxide Nanocrystals", American Chemical Society, Anaheim, March 2004. *(Invited)*
42. 39. "Synthesis and Properties of Transition Metal Oxide Nanocrystals", Louisiana State University, Nanotech Conference, February, 2004. *(Invited)*
43. 40. "Nanocrystals as artificial atoms in the assembly of multicomponent systems that mimic Zintl phases: Three-dimensional binary superlattices of magnetic nanocrystals and semiconductor quantum dots", American Chemical Society, New York, Sept. 2003. *(Invited)*
44. 41. "The synthesis, characterization and properties of transition metal oxide nanocrystal and nanocrystal composite systems," American Chemical Society, New York, Sept. 2003.
45. 42. "Controlled Growth of Oriented Single Walled Carbon Nanotubes from Mesoporous Silica", Materials Research Society, San Francisco, April, 2003.
46. 43. "A Chemical Perspective to Strategy and Design of Nanoscale Materials", 17th Annual National Educators Workshop, San Hose, October 2002. (*Invited*)
47. 44. "The Synthesis, Characterization and Properties of Oxide Nanoparticle and Nanoparticle Composite Systems", Ninth International Conference on Composites Engineering, San Diego, August, 2002. (*Invited*)

48. 45. "Oxide Nanoparticles: Synthesis Strategy and Size Dependent Properties" Gordon Research Conference on Nanostructures, New London, CT, July 2001. *(Invited)*
50. 46. "Monodisperse Oxide Nanoparticles with Applications in Ferroelectrics"American Ceramic Society 103rd Meeting, Indianapolis, April 2001. *(Invited)*

Other Meetings and Conference Presentations:
2003-08: O'Brien group researchers have presented over 40 talks and posters at peer reviewed international meetings, including MRS Spring and MRS Fall, ACS National meetings.

Patents

1. Pub. No.: WO/2004/060580 International Application No.: PCT/US2002/040550: "Method of preparation of biomagnetic nanoparticles coated with a noble metal layer."
[http://www.wipo.int/pctdb/en/wo.jsp?wo=2004060580]
2. Pub. No.: WO/2005/060610 International Application No.: PCT/US2004/041141: "Nano-sized particles, processes of making, compositions and uses thereof."
[http://www.wipo.int/pctdb/en/wo.jsp?wo=2005060610]
3. Pub. No.: WO/2006/004599 International Application No.: PCT/US2005/019441: "Methods for Preparing Single Walled Carbon Nanotubes."
4. US 2007/0059775: "Synthesis and Conjugation of Iron Oxide Nanoparticles to Antibodies for Targeting Specific Cells using Fluorescence and MR Imaging Techniques."
5. Pub. No.: WO/2007/117503 International Application No.: PCT/US2007/008389: "Preparing Nanoparticles and Carbon Nanotubes."
6. Pub. No.: WO/2007/136488 International Application No.: PCT/US2007/009637: "Copper Oxide Nanoparticle System."
7. Pub. No. WO/2008/118422 International Application No.: PCT/US2008/003878: "Metal Oxide Nanocrystals: Preparation and Uses."
8. "Barium Titanate Nanocrystal Applications" (provisional filing, M06-091: US 11/982,842, SLW2413.049wo1.

Selected Media Articles and Press Releases

http://www.ny-best.org/page/2011-ny-best-conference-proceedings
http://www.cuny.edu/site/energy.html
http://www1.cuny.edu/mu/energy-news/2010/12/16/energy-department-awards-cuny-energy-institute-4-6-million/
http://www.molecularstation.com/science-news/2010/09/energy-department-awards-cuny-energy-institute-4-6-million/

Amato, I. "Feature Article: A Periodic Table of Nanoparticles" Chemical and Engineering News 2006, 84, 45-46. http://pubs.acs.org/cen/science/84/8434sci1.html

"Stephen O'Brien, Renowned Nanotech Expert, Joins Panorama Labs Advisory Board." http://www.nsti.org/press/PRshow.html?id=1743

Columbia news: "Groundbreaking Research on Molecular Electronics Reported in Journal *Science*", Jan 20, 2006, http://www.columbia.edu/cu/news/06/01/nanotubes.html

Columbia news: "New Nanotechnological Structures Reported for the First Time in Journal *Nature*", Jan 06, 2006, http://www.columbia.edu/cu/news/06/01/superlattice.html

National Science Foundation: "A New Family of Self-Assembling Nanolattices", January 5, 2006 http://www.nsf.gov/news/news_summ.jsp?cntn_id=105690&org=NSF

Columbia news: "Magnetic and Semiconducting Nanocrystals Can Self-Assemble, Says Stephen O'Brien", Jan 28, 2004, http://www.columbia.edu/cu/news/media/03/steveObrien/index.html.

IBM Research News: "Scientists announce first 3D assembly of magnetic and semiconducting particles", June 25, 2003.

The Economist: "Nanomaterials move up a notch", Technology Quarterly, September 6, v. 368, no. 8340, 2003.

Forbes: "Top Five Nanotech Breakthroughs of 2003", www.forbes.com/technology, March, 2004.

Publications and Articles

1. Liu, S.; L.; Huang, L.; Li J.; O'Brien, S., "Intrinsic dielectric frequency dependent spectrum of a single domain tetragonal $BaTiO_3$" *Journal of Applied Physics* 112, 014108 (2012); http://dx.doi.org/10.1063/1.4734004.

2. Liu, S.; Zhang, H.; Lev Sviridov, L.; Huang, L.; Xiaohua Liu, X.; Jacopo Samson, J.; Akins, D. L.; Li J.; O'Brien, S. "Comprehensive Dielectric Performance of Bismuth Acceptor Doped $BaTiO_3$ Based Nanocrystal Thin Film Capacitors" *Journal of Materials Chemistry*, **2012**, 22, 21862-21870, DOI: 10.1039/C2JM34044E

3. Yang, S.; Tull, B. R.; Pervez, N. K.; Huang, L.; Leland, E. S.; Steigart, D. A.; O'Brien, S.; Kymissis, I. "Asymmetric Leakage in (Ba, Sr)TiO_3 Nanoparticle/Parylene-C Composite Capacitors", *Journal of Polymer Science B: Polymer Physics*, (2012) DOI: 10.1002/polb.23156.

4. Roussel, F.; Brun, J.-F., Alexandre Allart, A.; Huang, L.; O'Brien, S. "Horizontally-aligned carbon nanotubes arrays and their interactions with liquid crystal molecules: Physical characteristics and display applications." *AIP Advances* 2, **2012**, 012110.

5. Nguyen-Thanh, D.; Frenkel, A. I.; Wang, J.; O'Brien, S.; Akins, D. L. "Cobalt-Polypyrrole-Carbon Black (Co-PPY-CB) "Electrocatalysts for the Oxygen Reduction Reaction (ORR) in Fuel Cells: Composition and Kinetic Activity" *Applied Catalysis B: Environmental*, 105, 50-60, **2011**.

6. O'Brien, S. "High K Capacitors and OFET Gate Dielectrics from Self-Assembled BaTiO3 and (Ba,Sr) TiO3 Nanocrystals in the Superparaelectric Limit – On the Superparaelectric State in BaTiO3 Nanocrystals", *Advanced Functional Materials*, Materials Views (Comment) Volume 21, Issue 17, pages 3212–3213, September 9, 2011.

7. Huang, L.; Zhang, J.; Kymissis, I.; O'Brien, S. "High K thin films built from uniform Barium Titanate Nanocrystals in the Superparaelectric Limit" *Adv. Func. Mater.* **2010**, 20, 554-560.

8. Zhang, L.; Huang, L.; Lind, M.; Liao, V.; O'Brien, S; and Yu, Z., "Excitation, Temperature, and Structural Dependence of Second-Order Raman Modes in Single-Wall Carbon Nanotubes", *J. Phys. Chem. C*, **2009**, 113 (37), 16432–16438.

9. Chen, Z. and O'Brien, S. "Structure Direction of II-IV Semiconductor Quantum Dot Superlattices by Tuning Radius ratio", *ACS Nano*, **2008**, 2(6), 1219-1229.

10. Hultman, K. L.; Raffo, A. J.; Grzenda, A. L.; Harris, P. E.; Brown, T. R.; and O'Brien, S "Immunotargeted Superparamagnetic Iron Oxide Nanoparticles" *ACS Nano*, **2008**, 2(3), 477–484.

11. Lu, C.; Chen, Z. and O'Brien, S. "Optimized Conditions for the Self-Organization of CdSe-Au Binary Nanoparticle Superlattices" *Chemistry of Materials*, **2008**, 20(11), 3594-3600.

12. Wu, C.-K.; Hultman, K. L.; O'Brien, S.; Koberstein, J. T. "Functional Oligomers for the Control and Fixation of Spatial Organization in Nanoparticle Assemblies." *Journal of the American Chemical Society*, **2008**, 130(11), 3516-3520.

13. Zhang, L; Huang, L.; O'Brien, S.; and Yu, Z."Electrostatic Doping-induced Phonon Shift of Metallic Single-Wall Carbon Nanotubes." J. Phys. Chem. C **2008**, 112, 20118.

14. Li Zhang, Zhang Jia, Limin Huang, Stephen O'Brien, and Zhonghua Yu, "Low Temperature Raman Spectroscopy of Individual Single-Wall Carbon Nanotubes and Single-Layer Graphene." J. Phys. Chem. C **2008**, 112, 13893.

15. Yang Wu, Mingyuan Huang, Feng Wang, X. M. Henry Huang, Sami Rosenblatt, Limin Huang, Hugen Yan, Stephen P. O'Brien, James Hone, and Tony F. Heinz, "Determination of the Young's Modulus of Structurally Defined Carbon Nanotubes," *Nano Lett.*, **2008**, 8, 4158-4161.

16. Chen, Z.; Moore, J.; Radtke, G.; Sirringhaus, H and O'Brien, S "Binary Nanoparticle Superlattices in the Semiconductor-Semiconductor System: CdTe and CdSe" *Journal of the American Chemical Society* **2007**, 129(50); 15702-15709.

17. Yin, M.; Chen, Z.; Deegan, B.; O'Brien, S. "Wustite Nanocrystals: Synthesis, Structure and Superlattice Formation" *Journal of Materials Research* **2007**, *vol.22,* 7, 1987-1995.

18. Willis, A. L.; Chen, Z.; He, J.; Zhu, Y.; Turro, N. J.; O'Brien, S. "Metal acetylacetonates as general precursors for the synthesis of early transition metal oxide nanomaterials" *Journal of Nanomaterials,* **2007**, doi:10.1155/2007/14858.

19. Zhang, L.; Zhang, J.; Huang, L.; O'Brien, S.; Yu, Z." Imaging and Raman Spectroscopy of Individual Single-Wall Carbon Nanotubes on a Large Substrate" *Journal of Physical Chemistry B* **2007,** 111(30);11240-11245.

20. Funk, S.; Burghaus, U.; White, B.; O'Brien, S.; Turro, N. J. "Adsorption Dynamics of Alkanes on Single-Wall Carbon Nanotubes: A Molecular Beam Scattering Study", *Journal of Physical Chemistry C.*, **2007**, 111(22), 8043-8049.

21. White, B.; Banerjee, S.; O'Brien, S.; Turro, N. J.; Herman, I. P. "Zeta Potential Measurements of Surfactant-Wrapped Individual Single-Walled Carbon Nanotubes" **2007**, 111(37); 13684-13690.

22. Morales, M. A.; Skomski, R.; Fritz, S.; Shelburne, G.; Shiled, J. E.; Yin, M.; O'Brien, S.; Leslie-Pelecky, D. L. "Surface Anisotropy and Magnetic Freezing of MnO Nanoparticles" *Physical Review B* **2007**, 75, 134423.

23. Huang, L.; Jia, Z.; O'Brien, S. "Oriented Assembly of Single-Walled Carbon Nanotubes and Applications (Invited Review Article)" *Journal of Materials Chemistry* **2007**, 17, 3863 – 3874.

24. Gong, Y.; Andelman, T,; G. F. Neumark, G. F.; O'Brien, S.; Kuskovsky, I. L. "Origin of defect-related green emission from ZnO nanoparticles: effect of surface modification," *Nanoscale Res. Lett.* **2007**, 2, 297.

25. Andelman, T.; Gong, Y.; Neumark, G.; O'Brien, S. "Diameter Control and Photoluminescence of ZnO Nanorods from Trialkylamines" *Journal of Nanomaterials,* **2007**, doi:10.1155/2007/73824.

26. De Poortere, E. P.; Stormer, H. L.; Huang, L.; Wind, S. J.; O'Brien, S.; Huang, M.; Hone, J. "1-to 2-nm-wide nanogaps fabricated with single-walled carbon nanotube shadow masks", *Journal of Vacuum Science and Technology B.*, **2006**, 24, 6, 3213-3216.

27. White, B.; Yin, M.; Hall, A.; Le, D.; Stolbov, S.; Rahman, T.; Turro, N.; O'Brien, S. "Complete CO Oxidation over Cu2O Nanoparticles Supported on Silica Gel" *Nano Letters* **2006**, 6, 2095-2098.

28. Wang, F.; Sfeir, M. Y.; Huang, L.; Huang, X. M. H.; Yang Wu, J. K.; Hone, J.; O'Brien, S.; Brus, L. E.; Heinz, T. F. "Interactions between Individual Carbon Nanotubes Studied by Rayleigh Scattering Spectroscopy" *Physical Review Letters* **2006**, 96, 167401.

29. Shevchenko, E. V.; Talapin, D. V.; Murray, C. B.; O'Brien, S. "Structural Characterization of Self-Assembled Multifunctional Binary Nanoparticle Superlattices" *Journal of the American Chemical Society* **2006**, 128, 3620-3637.

30. Shevchenko, E. V.; Talapin, D. V.; Kotov, N. A.; O'Brien, S.; Murray, C. B. "Structural diversity in binary nanoparticle superlattices" *Nature* **2006**, 439, 55-59.

31. Sfeir, M. Y.; Beetz, T.; Wang, F.; Huang, L.; Huang, X. M. H.; Huang, M.; Hone, J.; O'Brien, S.; Misewich, J. A.; Heinz, T. F.; Wu, L.; Zhu, Y.; Brus, L. E. "Optical Spectroscopy of Individual Single-Walled Carbon Nanotubes of Defined Chiral Structure" *Science* **2006**, 312, 554.

32. Huang, L.; White, B.; Matthew Y. Sfeir; Huang, M.; Huang, H. X.; Wind, S.; Hone, J.; O'Brien, S. "Cobalt Ultrathin Film Catalyzed Ethanol Chemical Vapor Deposition of Single-Walled Carbon Nanotubes" *Journal of Physical Chemistry B* **2006**, 110, 11103-11109.

33. Huang, L.; Chen, Z.; Wilson, J. D.; Banerjee, S.; Robinson, R. D.; Herman, I. P.; Laibowitz, R.; O'Brien, S. "Barium titanate nanocrystals and nanocrystal thin films: synthesis, ferroelectricity and dielectric properties" *Journal of Applied Physics* **2006**, 100, 034316.

34. Guo, X. F.; Small, J. P.; Klare, J. E.; Wang, Y. L.; Purewal, M. S.; Tam, I. W.; Hong, B. H.; Caldwell, R.; Huang, L. M.; O'Brien, S.; Yan, J. M.; Breslow, R.; Wind, S. J.; Hone, J.; Kim, P.; Nuckolls, C. "Covalently bridging gaps in single-walled carbon nanotubes with conducting molecules" *Science* **2006**, 311, 356-359.

35. Wu, CK; Yin, M; O'Brien, S; Koberstein, J. T. "Quantitative analysis of copper oxide nanoparticle composition and structure by X-ray photoelectron spectroscopy", Chemistry of Materials, **2006**, 18(25), 6054-6058.

36. Chen, Z.; Huang, L.; He, J.; Zhu, Y.; O'Brien, S. "New nonhydrolytic route to synthesize crystalline BaTiO3 nanocrystals with surface capping ligands" *Journal of Materials Research* **2006**, 21, 3187-3195.

37. Banerjee, S.; White, B.; Huang, L.; Rego, B. J.; O'Brien, S.; Irving P. Herman "Precise Positioning of Nanotubes by AC Dielectrophoresis Using Floating Posts" *Applied Physics A Materials Science Processing* **2006**, 86, 415-419.

38. Banerjee, S.; White, B.; Huang, L.; Rego, B. J.; O'Brien, S.; Herman, I. P. "Precise Positioning of Single-Walled Carbon Nanotubes by AC Dielectrophoresis" *Journal of Vacuum Science and Technology. B* **2006**, 24, 3173.

39. Chandra, B.; Robert Caldwell, R.; Mingyuan Huang, M.; Limin Huang , L.; Sfeir, M. Y; O'Brien, S.; Heinz, T. F.; James Hone, J., "Electrical transport measurements of nanotubes with known (n, m) indices", phys. stat. sol., **2006**, (b) 243, No. 13, 3359–3364.

40. Papaefthymiou, G. C.; Redl, F. X., Black, C. T.; Sandstrom, R. L., Yin, M., Murray, C. B., O'Brien, S. P. "Hybrid magnetic nanoparticles derived from wustite disproportionation reactions at the nanoscale" Hyperfine Interactions, **2005**, 165, 7, 239-245.

41. Zhu, Z. M.; Andelman, T.; Yin, M.; Chen, T. L.; Ehrlich, S. N.; O'Brien, S. P.; Osgood, R. M. "Synchrotron x-ray scattering of ZnO nanorods: Periodic ordering and lattice size" *Journal of Materials Research* **2005**, 20, 1033-1041.

42. Yin, M.; Wu, C. K.; Lou, Y. B.; Burda, C.; Koberstein, J. T.; Zhu, Y. M.; O'Brien, S. "Copper oxide nanocrystals" *Journal of the American Chemical Society* **2005**, 127, 9506-9511.

43. Willis, A. L.; Turro, N. J.; O'Brien, S. "Spectroscopic characterization of the Surface of Iron Oxide Nanocrystals" *Chemistry of Materials* **2005**, 17, 5970-5975.

44. Shevchenko, E. V.; Talapin, D. V.; O'Brien, S.; Murray, C. B. "Polymorphism in AB(13) nanoparticle superlattices: An example of semiconductor-metal metamaterials" *Journal of the American Chemical Society* **2005**, 127, 8741-8747.

45. Lou, Y.; Yin, M.; O. Brien, S; Burda, C. "Electron-hole pair relaxation dynamics in binary copper-based semiconductor quantum dots" *Journal of the Electrochemical Society* **2005**, 152, G427-31.

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