December 2011

Raffaella Buonsanti

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EDUCATION

University of Salento, Lecce, Italy

PhD in Nanoscience at the National Nanotechnology Laboratory 2010

Thesis: *"Colloidal nanocrystals and nanocrystal heterostructures based on titanium dioxide"*

Major Field: colloidal synthesis

Minor Field: photocatalysis

advisor: Dr. P.D. Cozzoli

University of Bari, Italy

M.S in Chemistry 2006

Thesis:" *Nanocrystalline heterostructures based on titanium dioxide and iron oxide*

magna cum laude

advisor: Prof. A. Agostiano

co-advisor: Dr. M.L. Curri

RESERCH EXPERIENCE

Lawrence Berkeley National Laboratory, Berkeley, CA 2010-present

Advisor: Dr. D. Milliron-Molecular Foundry, Material Science Division

Postdoctoral Fellow

- colloidal synthesis of doped-metal oxide nanoparticles
- surface functionalization of colloidal nanoparticles for water transfer
- hybrid mesoporous film

University of Graz, Austria March 2009

Visiting student at the Christian Doppler Laboratory for Microwave Chemistry for nanocrystal synthesis assisted by microwave.

Referee: Prof. O. Kappe

University of Palermo, Italy Dec 2008

Visiting student in the Photocatalysis Group (DCPM) for photocatalytic tests on titanium dioxide nanorods

Referee: Prof. L. Palmisano

National Nanotechnology Laboratory-Lecce, Italy Sept2006-March2007

Post graduate fellowship on nanocrystal synthesis for drug delivery

Referee: Dr. T. Pellegrino

University of Bari, Italy March2006-July2006
Post graduate fellowship on nanocrystal synthesis and photocatalytic application
Referee: Dr. M. L. Curri

SKILLS AND EXPERTISE

- Chemical synthesis of inorganic nanocrystals by means of colloidal techniques;
- Use of standard air-free techniques (Schlenk-line, glove box);
- Electron microscopy characterization of nanocrystals: SEM, TEM;
- Spectroscopic investigation techniques: UV-Vis, FT-IR, Raman, ICP-AES;
- x-Ray Diffraction
- Thermogravimetric Analysis
- Nuclear magnetic resonance (NMR) spectroscopy: ^{1}H NMR and ^{13}C NMR

PUBLICATIONS

22) E. Rosen, R. Buonsanti, A. Llordes, A. Sawverl D. J. Milliron, B. Helms "Exceptionally Mild Reactive Stripping of Native Ligands from Nanocrystal Surfaces Using Meerwein's Salt" *Angew. Chemie. Int. Ed.* **2011**, DOI: 10.1002/anie.201105996

21) R. Buonsanti, E. Carlino, C. Giannini, D. Altamura, L. De Marco, R. Giannuzzi, M. Manca, G. Gigli,, P. D. Cozzoli "Hyperbranched Anatase TiO2 Nanocrystals: Nonaqueous Synthesis, Growth Mechanism, and Exploitation in Dye-Sensitized Solar Cells" *J. Am. Chem. Soc.* **2011**, 133, 19216

20) R. Buonsanti, A. Llordes, S. Aloni, B. Helms, D. J. Milliron "Tunable Infrared Absorption and Visible Transparency of Colloidal Aluminum-Doped Zinc Oxide Nanocrystals" *Nano Lett*. **2011**, 11, 4706

19) G. Garcia, R. Buonsanti, E.L. Runnerstrom, R. J. Mendelsberg, A. Llordes, A. Anders, T. J. Richardson, D. J. Milliron "Dynamically Modulating the Surface Plasmon Resonance of Doped Semiconductor Nanocrystals" *Nano Lett.* **2011**, 11, 4415

18) L. De Marco, M. Manca, R. Buonsanti, R. Giannuzzi, F. Malara, P. Pareo, L. Martiradonna, N. M. Giancaspro, P. D. Cozzoli, G. Gigli "High-quality photoelectrodes based on shape-tailored TiO2 nanocrystals for dye-sensitized solar cells" *J. Mater. Chem.* **2011**, 21, 13371

17) M. Levy, A. Quarta, A. Espinosa, A. Figuerola, C. Wilhelm, M. Garcia-Hernandez, A. Genovese, A. Falqui, D. Alloyeau, R. Buonsanti, P. D. Cozzoli, M. A. Garcia, F. Gazeau, T. Pellegrino "Correlating Magneto-Structural Properties to Hyperthermia Performance of Highly Monodisperse Iron Oxide Nanoparticles Prepared by a Seeded-Growth Route" *Chem. Mater.* **2011**, 23, 4170

16) A. P. Caricato, R. Buonsanti, M. Catalano, M. Cesaria, P. D. Cozzoli, A. Luches, M. G. Manera, M. Martino, A. Taurino and R. Rella "Films of brookite TiO2 nanorods/nanoparticles deposited by matrix-assisted pulsed laser evaporation as NO2 gas-sensing layers" *J. Appl.Phys. A* **2011**, 104, 963

15) A. Llordes, A. T. Hammack, R. Buonsanti, R. Tangirala, S. Aloni, B. A. Helms, D. J. Milliron "Polyoxometalates and colloidal nanocrystals as building blocks for metal oxide nanocomposite films" *J. Mater. Chem.* **2011**, 21, 11631

14) I. C. Lekshmi, R. Buonsanti, C. Nobile, R. Rinaldi, P. D. Cozzoli, G. Maruccio "Tunneling Magnetoresistance with Sign Inversion in Junctions Based on Iron Oxide Nanocrystal Superlattices", *ACS Nano* **2011**, 5, 1731-1738

13) D. Fragouli, B. Torre, G. Bertoni, R. Buonsanti, R. Cingolani, A. Athanassiou "Formation and Microscopic Investigation of Iron Oxide Aligned Nanowires Into Polymeric Nanocomposite Films" *Microscopy Research and Tecnique* **2010**, 73, 952-958

12) R. Buonsanti, E. Carlino, V. Grillo, C. Giannini, F. Gozzo, M.Garcia-Hernandez, M.A. Garcia, R. Cingolani, P.D. Cozzoli "Architectural Control of Seeded Grown Iron Oxide/TiO_2 Nanorod Heterostructures: The Role of Seeds in Topology Selection" *J. Am. Chem. Soc.* **2010**, 132, 2437–2464

11) D. Fragouli, R. Buonsanti, G. Bertoni, A. Falqui, C. Sangregorio, C. Innocenti, D. Gatteschi, P.D. Cozzoli, A. Athanassiou, R. Cingolani, "Dynamical formation of spatially localized arrays of aligned nanowires in plastic films with magnetic anisotropy." *ACS Nano* **2010**, 4, 1873

10) V. Petkov, P. D. Cozzoli, R. Buonsanti, R. Cingolani, Y. Ren "Size, shape and internal atomic ordering of nanocrystals by atomic pair distribution functions: a comparative study of γ-Fe_2O_3 nanosized spheres and tetrapods" *J. Am. Chem. Soc.* **2009**, 131, 14264–14266

9) R. Buonsanti, E. Snoeck, C. Giannini, F. Gozzo, M. Garcia-Hernandez, M. A. Garcia, R. Cingolani, P. D. Cozzoli "Colloidal semiconductor-magnetic heterostructures based on iron-oxide-functionalized brookite nanorods" *Phys. Chem. Chem. Phys.* **2009**, 11, 3680-3691

8) R. Di Corato, P. Piacenza, M. Musarò, R. Buonsanti, P.D. Cozzoli, M. Zambianchi, G. Barbarella, R. Cingolani, L.Manna, T. Pellegrino "Magnetic-fluorescent colloidal nano-beads: preparation and exploitation in cell separation experiment" *Macromol. Biosci.* **2009**, 9, 952-958

7) R. Buonsanti, V. Grillo, E. Carlino, C. Giannini, T. Kipp, R. Cingolani and P. D. Cozzoli "Nonhydrolitic synthesis of high quality anisotropically shaped brookite TiO_2 nanocrystals" *J. Am. Chem. Soc.* **2008**, 130 11223–11233

6) R. Di Corato, A. Quarta, P. Piacenza, A. Ragusa, A. Figuerola, R. Buonsanti, R. Cingolani, L. Manna, T. Pellegrino "Water solubilization of hydrophobic nanocrystals by means of poly(maleic anhydride-alt-1-octadecene)" *J. Mater. Chem.* **2008**, 18, 1991-1996

5) G. Caputo, C. Nobile, R. Buonsanti, T. Kipp, L. Manna, R. Cingolani, P. D. Cozzoli, A. Athanassiou "Determination of surface properties of various substrates using TiO_2 nanorod coatings with tuneable characteristics" *J. Mater. Sci.* **2008**, 43, 3474

4) M. Casavola, R. Buonsanti, G. Caputo, P. D. Cozzoli, "Colloidal strategies for preparing oxide-based hybrid nanocrystals", *Eur. J. Inorg. Chem.* **2008**, 6, 837-854

3) G. Caputo, R. Buonsanti, M. Casavola, P. D. Cozzoli "Synthetic strategies to multi-material hybrid nanocrystals", Advanced wet-chemical synthetic approaches to inorganic nanostructures, P. D. Cozzoli Ed.; Transworld Research Network, Kerala, India, 2008, chapter 14 (pp. 407-453), ISBN 978-81-7895-361-8

2) R. Buonsanti, M. Casavola, G. Caputo, P. D. Cozzoli, "Advances in the chemical fabrication of complex multimaterial nanocrystals", *Recent Pat. Nanotechnol.* **2007**, 1 , 224-232

1) R. Buonsanti, V. Grillo, E. Carlino, C. Giannini, M. L. Curri, C. Innocenti, C. Sangregorio, K. Achterhold, F. G. Parak, A. Agostiano, P. D. Cozzoli, "Seeded Growth of Asymmetric Binary Nanocrystals Made of a Semiconductor TiO_2 Rodlike Section and a Magnetic γ-Fe_2O_3 Spherical Domain" *J. Am. Chem. Soc.* **2006**, 128, 16953 – 16970

CONTRIBUTIONS TO CONFERENCES

Oral Presentation: *"Colloidal aluminum-doped zinc oxide nanocrystals for electrochromic devices"* , Materials Research Society (MRS) Spring Meeting 2011, San Francisco-CA

Oral Presentation: *"Synthesis of colloidal aluminum-doped zinc oxide nanoparticles"*, Materials Research Society (MRS) Fall Meeting 2010, Boston-MA

Oral Presentation: *"Nanocristalline Heterostructures based on a titanium dioxide rod section "*, Nanotech 2009, Houston -TX

Oral Presentation: *"Colloidal magnetic-semiconductor oxide heterostructures: site-selective epitaxial growth of spherical γ-Fe_2O_3 domains onto phase-controlled TiO_2 nanorods"* , Nanoscience with Nanocrystals (NANAX3) Conference 2008, Lecce- Italy

Poster Presentation: "Nonhydrolytic Synthesis of High-Quality Anisotropically Shaped Brookite TiO_2 Nanocrystals", Solar Chemistry and Photocatalysis: Environmental Applications (SPEA) 2008, Palermo-Italy

Oral Presentation: *"Colloidal magnetic-semiconductor oxide heterostructures"* , Materials Research Society (MRS) Spring Meeting 2008, San Francisco-CA

Oral Presentation: *"Colloidal synthesis and growth mechanism of asymmetric nanocrystal heterostructures made of a semiconductor titania rod-like section and a magnetic iron oxide spherical domain"* Nanotech Northern Europe (NTNE) 2007, Helsinki-Finland

SCHOOLS

● Advanced theoretical/experimental school on Scanning Electron Microscopy in Materials Science - Lecce (Italy) 10-14 December 2007 - CNR-IMM

● Patterning at the nanoscale, PANAMA Summer School- Toulouse (France), 4-15 July 2005-LAAS-CNRS