

CURRICULUM VITAE: ERIK C. DREADEN



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EDUCATION

BSCHEM, Chemistry (2006); University of Georgia, USA
Prof. J.L. Stickney
Electroanalytical Chemistry and Electrochemical Synthesis of Nanostructured Thin Films

PhD Candidate, Chemistry & Biochemistry (2011); Georgia Institute of Technology, USA
Prof. M.A. El-Sayed
Diagnostic and therapeutic cancer nanotechnologies.
Time-resolved spectroscopy and computational electrodynamics of plasmonic nanostructures.
3.77/4.00 GPA; anticipated graduation: Fall 2011/ Spring 2012

EMPLOYMENT HISTORY

Teaching Assistant:
08/2006 - 05/2007: GA Institute of Technology, Dept of Chemistry and Biochemistry
Undergraduate General Chemistry Lecture and Laboratory
Undergraduate Organic Chemistry Synthesis Laboratory

Research Assistant:
05/2006 - present: GA Institute of Technology, Dept of Chemistry and Biochemistry (Prof. M.A. El-Sayed)
05/2004 - 05/2006: University of GA, Dept of Chemistry (Prof. J.L. Stickney)

AWARDS

2010 Graduate Student Award: 60th Meeting of Nobel Laureates, Lindau, Germany
Center for Drug Design, Development, and Delivery (CD4) Predoctoral Fellowship (2010 – 2011)
2010 Anthony Shuker Award (Georgia Research Alliance)
Robert Bosch Foundation Fellowship (2010)
GAANN Fellowship (2006 – 2008)
William H. Emerson Fellowship (2006 – 2007)

MANUSCRIPTS

Published / In Press

1. Dreaden, E. C.; El-Sayed, M.A.; El-Sayed, I.H. Nanotechnology and Nanostructures Applied in Head and Neck Cancer. In *Nanomedicine and Cancer*; 1st Ed. Preedy, V.R. Ed. Science Publishers: Enfield, NH, 2011; pp. X – X, in press. ISBN 978-1-57808-727-3.

2. Yen, C.-W.; Hayden, S.C.; Dreaden, E.C.; Szymanski, P.; El-Sayed, M.A., Tailoring Plasmonic and Electrostatic Field Effects to Maximize Solar Energy Conversion by Bacteriorhodopsin, the Other Natural Photosynthetic System. *Nano Letters*, 2011, ASAP.
3. Dreaden, E. C.; Mackey, M.A.; Huang, X.; Kang, B.; El-Sayed, M.A., Beating Cancer in Multiple Ways Using Nanogold. *Chemical Society Reviews*, 2011, 40 (7), 3391–3404.
4. Dreaden, E. C.; Near, R.D.; Abdallah, T.; Talaat, M.H.; El-Sayed, M.A., Multimodal Plasmon Coupling in Low Symmetry Gold Nanoparticle Pairs Detected in Surface-Enhanced Raman Scattering (SERS). *Applied Physics Letters*, 2011, 98, 183115.
5. Dreaden, E.C.; Neretina, S.; Qian, W.; Hughes, R.A.; Preston, J.S.; Mascher, P; El-Sayed, M.A., Plasmonic Enhancement of Nonradiative Charge Carrier Relaxation and Proposed Effects from Enhanced Radiative Electronic Processes in Semiconductor-Gold Core-Shell Nanorod Arrays. *Journal of Physical Chemistry C*, 2011, 115, 5578–5583.
6. Dreaden, E. C.; Mwakwari, S. C.; Sodji, Q. H.; Oyelere, A. K.; El-Sayed, M. A., Tamoxifen-Poly(ethylene glycol)-Thiol Gold Nanoparticle Conjugates: Enhanced Potency and Selective Delivery for Breast Cancer Treatment. *Bioconjugate Chemistry*, 2009, 20, 2247–2253.
7. Neretina, S.; Dreaden, E.C.; Qian, W.; Hughes, R.A.; Preston, J.S.; Mascher, P; El-Sayed, M.A., The Dependence of the Plasmon Field Induced Nonradiative Electronic Relaxation Mechanisms on the Gold Shell Thickness in Vertically Aligned CdTe–Au Core–Shell Nanorods. *Nano Letters*, 2009, 9 (11), 3772–3779.
8. Neretina, S.; Qian, W.; Dreaden, E.C.; El-Sayed, M. A.; Hughes, R. A.; Preston, J. S.; Mascher, P, Exciton Lifetime Tuning by Changing the Plasmon Field Orientation with Respect to the Exciton Transition Moment Direction: CdTe-Au Core-Shell Nanorods. *Nano Letters*, 2009, 9 (3), 1242-1248.
9. Dreaden, E.C.; * Dickerson, E. B.; * Huang, X.; * El-Sayed, I. H.; Chu, H.; Pushpanketh, S.; McDonald, J. F.; El-Sayed, M. A., Gold nanorod assisted near-infrared plasmonic photothermal therapy (PPTT) of squamous cell carcinoma in mice. *Cancer Letters*. 2008, 269 (1), 57-66.
*Equal Contribution
10. Neretina, S.; Qian, W.; Dreaden, E.C.; El-Sayed, M. A.; Hughes, R. A.; Preston, J. S.; Mascher, P, Plasmon field effects on the nonradiative relaxation of hot electrons in an electronically quantized system: CdTe-Au core-shell nanowires. *Nano Letters*, 2008, 8 (8), 2410-2418.

Submitted / In Preparation:

11. Dreaden, E.C.; Mwakwari, S.C.; Austin, L.A.; Humphries IV, W.H.; Oyelere, A.K.; El-Sayed, M.A. Evasion of Multidrug Resistance (MDR) by Gold Nanoparticle Conjugates: Ligand-Dependence and Efflux Inhibition. *submitted to Angew. Chemie. Int. Ed.*
12. Dreaden, E.C.; Gryder, B.G.; Austin, L.A.; Tene Defo, B.A.; Hayden, S.C.; Oyelere, A.K.; El-Sayed, M.A., Overcoming Treatment Resistance in Hormone–Insensitive Prostate Cancer Using Antiandrogen–Nanoparticles. *submitted to J. Am. Chem. Soc.*
13. Dreaden, E.C.; Alkilany, A.; Murphy, C.J.; El-Sayed, M.A. The Golden Age: Gold Nanoparticles for Biomedicine. *Invited Review submitted to Chem. Soc. Rev.*
14. Dreaden, E.C.; Mwakwari, S.C.; Austin, L.A.; Kieffer, M.J.; Oyelere, A.K.; El-Sayed, M.A. Macrolide Gold Nanorod Conjugates for Targeted Laser Photothermal Therapy of Lung Cancer. *in preparation.*

15. Dreaden, E. C.; El-Sayed, M.A.; Worth More Than Its Weight: Gold Nanoparticles in Drug Delivery. *Invited Review for Therapeutic Delivery, in preparation.*

PATENTS

Oyelere, A.K.; El-Sayed, M.A.; Dreaden, E.C.; 2010 Sept. 24, Targeted Cellular Delivery of Nanoparticles. United States patent 12/890,519 pending.

Dreaden, E.C.; Oyelere, A.K.; Gryder, B.; El-Sayed, M.A.; 2011 Aug. Endocrine Targeted Nanotechnologies for Breast, Prostate, Ovarian, and other Hormone-Associated Cancers. Application pending.

SYNERGISTIC ACTIVITIES

04/2011 – present: Ad Hoc Reviewer, Physical Chemistry Chemical Physics (RSC)
05/2008 – present: Mentor, Big Brothers Big Sisters of Metro Atlanta (Atlanta, GA)
08/2007 – present: Mentor, New Chemistry Graduate Students (D. Snare, S. Hayden, P. Bagchi, C. Ruschman, S. Lee, GA Inst of Technology)
08/2007 – present: Volunteer, National Nanotechnology Infrastructure Network (NNIN) Youth Outreach Program
01/2011 – 05/2011: Undergraduate Research Mentor (L. Romero, GA Inst of Technology)
07/2010: Invited Participant: 2010 Euroscience Forum; Torino, Italy
05/2010 – 08/2010: Mentor, NNIN-REU (F. O'Connell, GA Inst of Technology)
03/2010 – 04/2010: Invited Participant: 2010 NSF US-Egypt Advanced Studies Institute (ASI) Workshop; Cairo, Egypt
08/2009 – 05/2010: Undergraduate Research Mentor (M. Kieffer, GA Inst of Technology)
08/2009 – 05/2010: Georgia Tech Academic Jobs Discussion Group
08/2008 – 12/2008: Undergraduate Research Mentor (L. Tankesley, GA Inst of Technology)
05/2008 – 05/2009: Undergraduate Research Mentor (N. Bloodworth, GA Inst of Technology)
05/2008 – 08/2008: Mentor, National Science Foundation-REU (O. Dellanoy-Bruno, GA Inst of Technology)
08/2000 – 05/2002: Mentor, Big Brothers Big Sisters of Metro Atlanta (Stockbridge, GA)

PRESENTATIONS

1. Dreaden, E.C.; Gryder, B.G.; Austin, L.A.; Mwakwari, S. C.; Sodji, Q. H.; Tene Defo, B.A.; Hayden, S.C.; Oyelere, A.K.; El-Sayed, M.A., Hormone Receptor Targeted Nanotechnologies for Breast and Prostate Cancer Treatment. Second Annual Investigators Meeting of the Phase II NCI Alliance for Nanotechnology in Cancer (ANC). 2011 Sept 31-23, Boston, MA.
2. Dreaden, E.C.; Dickerson, E.B.; El-Sayed, I.H.; Huang, X.; McDonald, J.F.; Oyelere, A.K.; El-Sayed, M.A., Anti-Cancer Gold Nanoparticle Conjugates: Endocrine Targeted Treatment Strategies and Laser Photothermal Therapy. Nanotech 2011 Conference and Expo. 2011 Jun 13-16, Boston, MA.
3. Dreaden, E. C.; Gold Nanoparticles in Cancer Diagnostics and Therapeutics. 2011 Fellows of the Center for Drug Design, Development, and Delivery (CD4) Meeting. 2011 Feb 8, Atlanta, GA.

4. Dreaden, E. C.; Neretina, S.; Qian, W.; Hughes, R.A.; Preston, J.S.; Mascher, P; El-Sayed, M.A., Plasmonic Enhancement of Nonradiative Charge Carrier Relaxation in Vertically Aligned Semiconductor-Metal Core-Shell Nanorod Arrays. 2011 Georgia Tech Research Innovation Conference (gtRIC). 2011 Feb 8. Atlanta, GA.
5. Dreaden, E. C.; Mwakwari, S.C.; Sodji, Q.H.; Oyelere, A.K.; Dickerson, E.B.; Huang, X.; Chu, H.; Pushpanketh, S.; El-Sayed, I.H.; McDonald, J.F.; El-Sayed, M.A. , Multimodal Cancer Treatment Strategies Using Small-Molecule Targeted Gold Nanoparticles. Georgia Life Sciences Summit 2010. 2010 Oct 28; Atlanta, GA.
***Best Presentation Award**
6. Dreaden, E. C.; Neretina, S.; Qian, W.; Hughes, R.A.; Preston, J.S.; Mascher, P; El-Sayed, M.A., Plasmon-Exciton Coupling in Vertically Aligned Core-Shell CdTe-Au Nanorod Arrays. The US-Egypt Advanced Studies Institute (ASI) on "Nanomaterials and Nanocatalysis for Energy, Petrochemicals and Environmental Applications". 2010 Mar 27 – April 5; Cairo, Egypt.
7. Dreaden, E. C.; Mwakwari, S. C.; Sodji, Q. H.; Oyelere, A. K.; El-Sayed, M. A., Enhancing Breast Cancer Drug Potency Via Nanoparticle Ligation. 2010 Meeting of the Integrative BioSystems Institute (IBSI). 2010 Mar 3. Atlanta, GA.
8. Dreaden, E. C.; Mwakwari, S. C.; Sodji, Q. H.; Dickerson, E. B.; Huang, X.; Chu, H.; Pushpanketh, S.; El-Sayed, I. H.; Oyelere, A. K.; McDonald, J. F.; El-Sayed, M. A., Gold Nanoparticles in Cancer Drug Delivery and Photothermal Therapeutics. 2010 Georgia Tech Research Innovation Conference (gtRIC). 2010 Feb 8. Atlanta, GA.
9. Dreaden, E. C.; Mwakwari, S. C.; Sodji, Q. H.; Dickerson, E. B.; Huang, X.; Chu, H.; Pushpanketh, S.; El-Sayed, I. H.; Oyelere, A. K.; McDonald, J. F.; El-Sayed, M. A., Gold Nanoparticles in Cancer Drug Delivery and Photothermal Therapeutics. The Festival of Research Ideas in Cancer Biology and Technology. 2009 Nov 19; Atlanta, GA.
10. Tabor, C.; Neretina, S.; Dreaden, E. C.; El-Sayed, M. A., Application of the universal scaling law in the coupling of plasmonic nanoparticle pairs of unique symmetries. 236th ACS National Meeting, American Chemical Society: Philadelphia, PA, United States, 2008; pp PHYS-427

PROFESSIONAL QUALIFICATIONS

Certifications and Accreditations

Certified in the Care and Use of Laboratory Animals (Aseptic Surgery of Rodents, Anesthesia and Analgesia of Rodents, Occupational Health and Safety, Laboratory Mouse- and Dog- Specific)
 American Chemical Society (ACS) certified Bachelor's degree in Chemistry
 Certified in Experimental Techniques and Safety Procedures for Radioactive Materials

Technical Skills

Transmission Electron Microscopy & Scanning Probe Microscopy
 Flow Cytometry
 Laser Scanning Confocal Fluorescence Microscopy
 Computational Electromagnetics (Finite-Element Methods)
 Ultrafast Laser Spectroscopy
 Surface-Enhanced Raman & Infrared Vibrational Spectroscopy
 Mammalian Cell Culture and Microplate Assay Techniques
 Xenograft Transplantation (Murine)
 In vivo Laser-Ablative Therapeutics
 Colloidal & Electrochemical Nanoparticle Synthesis
 Optical Microscopy/Time-resolved Fluorescence Spectroscopy
 Small Animal MRI

Supplementary Graduate Coursework

Drug Design, Development and Delivery (Georgia Institute of Technology, Spring 2011)
Managing Resources of the Technological Firm (Georgia Institute of Technology, Fall 2007)
Electrochemistry and Electroanalytical Chemistry (University of Georgia, Spring 2006)

PROFESSIONAL MEMBERSHIPS

02/2011 – present: American Association for the Advancement of Science (AAAS)

05/2006 – present: American Chemical Society (ACS)

Nanoscience Division

Medicinal Chemistry Division

Physical Chemistry Division

Inorganic Chemistry Division

08/2004 – 05/2006: Student Affiliates of the American Chemical Society (SAACS)

RECOMMENDATIONS

Prof. Mostafa A. El-Sayed (*Ph.D. Advisor*)

Julius Brown Chair, Regents' Professor, US National Academy of Sciences
Director, Laser Dynamics Laboratory
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Prof. Zhong Lin Wang

Hightower Chair in Materials Science and Engineering, Regents' Professor
Distinguished Professor, College of Engineering; Professor, School of Chemistry and Biochemistry
Director, Center for Nanostructure Characterization (CNC)
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CONTACT INFORMATION

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Work

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