

## Curriculum Vitae

### Naomi J. Halas

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- EDUCATION: 1987 Ph.D. (Physics) Bryn Mawr College  
1984 M.A. (Physics) Bryn Mawr College  
1980 B.A. (Chemistry) La Salle College, magna cum laude
- POSITIONS: 2006 – present Professor, Department of Biomedical Engineering, Rice University  
2004 – present Director, Laboratory for Nanophotonics, Rice University  
2001 – present Stanley C. Moore Professor in Electrical and Computer Engineering, Rice University  
1999 – present Professor, Department of Chemistry, Rice University  
1999 – 2001 Professor, Department of Electrical and Computer Engineering, Rice University  
1994 – 1999 Associate Professor, Rice University  
1989 – 1994 Assistant Professor, Rice University  
1987 – 1989 Postdoctoral Associate, AT&T Bell Laboratories, Holmdel, NJ  
1987 Postdoctoral Associate, Vanderbilt University  
1983 – 1986 Graduate Research Fellow, IBM T.J. Watson Research Center, Yorktown Heights, NY
- HONORS AND AWARDS: 2007 Fellow, SPIE-The International Society for Optical Engineering  
2006 *Esquire's* Best and Brightest, December 2006  
2006 Nanotech Brief's Nano 50 Innovator Award  
2005 Fellow, American Association for the Advancement of Science  
2005 Woman of Achievement, YWCA Houston  
2004 Small Times Magazine's Best Researcher of 2004; finalist  
2004 Nanotechnology Now's "Best Discovery of 2003"  
2004 Senior Member, IEEE  
2003 Fellow, Optical Society of America  
2003 Breast Cancer Research Program Innovator Award, U. S. Army Medical Research and Materiel Command, Congressionally Funded Medical Research Programs, Department of Defense  
2003 Chevy Trucks' "Lone Star Hero" (week of 11/10/03)  
2003 Hershel Rich Invention Award: Optically Active Nanoparticles for use in Therapeutic and Diagnostic Methods  
2001 Fellow, American Physical Society  
2001 Hershel M. Rich Invention Award: Photothermal Nanoshell-Polymer Drug Delivery Mat'l  
2000 CRS-Cygnus award for outstanding graduate student research (with S. Ser-shen, S. Westcott, and J. West)  
1998 Hershel M. Rich Invention Award: Metal Nanoshells  
1993 Hershel M. Rich Invention Award: C<sub>60</sub> Purification Method  
1992 National Science Foundation Young Investigator Award  
1991 Amoco Outstanding Young Faculty Award
- RESEARCH: Design and fabrication of optically responsive nanostructures, nanophotonics, plasmonics
- MISSION STATEMENT: To create new nanoscale objects that perform a function...to understand the physical properties of those objects, both at the microscopic and macroscopic level...to incorporate them into unique applications of societal and technological impact.
- COURSES TAUGHT: Nano- and Microphotonics Graduate Seminar

Physics of Reduced Dimensionality Structures Graduate Seminar  
Scanning Probe Microscopy Graduate Seminar  
Fundamentals of Nonlinear Optics  
Lasers and Quantum Electronics  
Topics in Nonlinear and Ultrafast Optics Graduate Seminar  
Quantum Mechanics for Engineers  
Solid State Physics for Engineers  
Electronic Materials for Engineers

RESEARCH GRANTS:

**Title:** A Multimodality Ultramicrospectroscopy (MUMS): Imaging with Integrated Spectroscopies for Chemical and Biomolecular Identification (PI with 8 co-PIs)  
DoD-OSD Grant Number: W911NF-04-1-0203  
Project Period: 06/01/04 - 05/31/09  
Total Project Award: \$5,226,396

**Description:** *This grant supports a team effort developing metallic nanostructures for surface enhanced spectroscopic fingerprinting of proteins and peptides by developing surface enhanced Raman Optical Activity (SEROA) and surface enhanced vibrational circular dichroism (SEVCD)*

**Title:** IGERT: Nanophotonics: Fundamentals and Applications in Emerging Technologies  
Grant Number: 0504425  
Project Period: 07/01/05-06/30/10  
Total Project Award: \$3,086,640

**Description:** *This grant supports graduate training and research in the emerging field of nanophotonics*

**Title:** Development of Nanoscale Probes for Enhanced Vibrational Spectroscopy (co-PI with 3 other investigators)  
NSF Grant Number: ECS-0421108  
Project Period: 09/01/04 - 08/31/06  
Total Project Award: \$250,000

**Description:** *This is an instrument development grant to build a scanning microscope with surface enhanced infrared spectroscopy capabilities*

**Title:** Seamless Integrated Detection and Therapy of Breast Cancer Using Targeted Engineered Nanoparticles (PI with 3 co-PIs)  
DoD-CDMRP Grant Number: DAMD17-03-1-0384  
Project Period: 05/13/03 - 06/14/07  
Total Project Award: \$2,973,424

**Description:** *This grant supports nanoshell-based cancer diagnostics and therapeutics with and without antibody-conjugate targeting of tumors*

**Title:** NIRT: Rationally Designed Nanosensing Substrates for Chemical and Biodetection (PI with 3 co-PIs)  
NSF Grant Number: EEC-0304097  
Project Period: 08/15/03 - 07/31/07  
Total Project Award: \$1,521,288

**Description:** *This grant supports fundamental studies of metallic nanostructured substrates for surface-enhanced spectroscopy (SERS) based chemical and biosensing*

**Title:** Chemistry and Photophysics of Layered Nanoparticle Surfaces  
Robert A. Welch Foundation Grant Number: C-1220  
Project Period: 06/01/04 - 05/31/07

Total Project Award: \$165,000

**Description:** *This grant supports fundamental studies of the chemistry and physical chemistry (fluorescence and surface enhanced spectroscopy for molecules bound to nanoparticle surfaces)*

**Title:** Nanoengineered Substrates for SERS Detection

AFOSR/STTR Phase II

Nanospectra Grant number: 05091503

Project Period: 01/01/05 - 12/31/06

Total Project Award: \$223,202

**Description:** *This grant focuses on the development of nanoshell based SERS detectors as commercially viable substrates: Phase I initial studies proved highly successful, motivating this Phase II funding*

**Title:** Enhanced Photophysical Processes in Controlled Electromagnetic

Nanoenvironments

AFOSR Grant number: FA9550-06-1-0021

Project Period: 02/01/06 - 11/30/09

Total Project Award: \$464,567

**Description:** *This grant supports fundamental science in the area of plasmon enhanced fluorescence, surface enhanced spectroscopies and plasmon induced photochemical processes*

**Title:** Biomimetic Sensor Research: Synthesis and Characterization of Functionalized Nanoshells for Chem/Bio Detection

USAF Grant number: USAF-5408-04-SC-0006 (via Anteon Corporation)

Project Period: 07/31/06 - 10/31/07

Total Project Award: \$50,000

**Description:** *This grant supports a collaboration with scientists at Wright Patterson Air Force Base on plasmon enhanced photophysical processes using biomolecules*

PATENTS: *Metal Nanoshells* 6,344,272, and 6,685,986 with Stephen J. Oldenburg, and Richard D. Averitt (composition of matter, and production methods, respectively)

*Temperature-Sensitive Polymer/Nanoshell Composites for Photothermally Modulated Drug Delivery* 6,428,811 and 6,645,517 with Jennifer L. West, Scott R. Sershen, Steven J. Oldenburg, and Richard D. Averitt.

*Optically-active nanoparticles for use in therapeutic and diagnostic methods*, 6,530,944 with Jennifer L. West and Leon Hirsch

*Partial Coverage metal nanoshells and method of making same*, 6,660,381 with Robert K. Bradley

*Optically-absorbing nanoparticles for enhanced tissue repair* 6,685,730 with Jennifer West, Rebekah Drezek, and Scott Sershen

*Metal Nanoshells for biosensing applications*, 6,699,724 with Jennifer West, Steve Oldenburg and Richard D. Averitt

*Nanoparticle-based all-optical sensors*, 6,778,316 with Surbhi Lal, Peter Nordlander, Joseph Jackson, and Cristin Moran

*Multi-layer nanoshells comprising a metallic or conducting shell*, 7,144,627 with Corey J. Radloff

MEMBERSHIPS: American Chemical Society (ACS)  
American Physical Society (APS)

Institute of Electrical and Electronics Engineers (IEEE)  
Optical Society of America (OSA)  
International Society for Optical Engineering (SPIE)  
American Association for the Advancement of Science (AAAS)

#### ACTIVITIES:

- Member of Editorial Advisory Board, Nano Letters
- Member, Keck Center for Gene Therapy, U. T. M. D. Anderson Cancer Center, Houston, TX
- Member of Scientific Review Board, Los Alamos National Laboratory, Materials Science and Technology Division
- Member of Visiting Advisory Board, Materials Research Science and Engineering Center, Pennsylvania State University
- Member, NRC Committee on Nanophotonics Accessibility and Applicability
- Co-Chair, Gordon Research Conference on Plasmonics, 2008
- Founding member, Nanospectra Biosciences, Inc.
- Member of multiple Program Committees, SPIE Conferences on Plasmonics and Applications in Biomedicine, 2002-2007
- Chair of Organizing Committee, SPIE Conference on Plasmonics, 2002-2005
- Member, NSF Site visit Review Committees, NSEC (Harvard, Northwestern U, UCLA) 2003
- Symposium Organizer for “Synthesis, Spectroscopy, Characterization and Application of Nanoparticles”, Division of Physical Chemistry, ACS Annual Meeting, March 2003
- Symposium Organizer for “Nanoparticles: Disks, Rods and Complex Shapes”, APS Annual Meeting, March 2003
- Symposium Organizer, Reduced Symmetry Nanostructures, Materials Research Society Meeting, November 2003.
- Member, Site visit Review Committee for NSF Nanobiotechnology Science and Technology Center (Cornell U.) , September 2002
- Member of Program Committee, SPIE Conference on Bio-MEMS and Smart Nanostructures, Adelaide Australia, December 2001
- Member of the Executive Committee, American Physical Society Division of Laser Science, 1996-1998
- Member of the Executive Committee, American Physical Society Texas Section, 1996-1998
- APS Division of Laser Science, Chair, Undergraduate Summer Research Grants Awards Committee, 1996-1998
- APS Laser Science Topical Group, Student Travel Grant Awards Committee, 1993-96
- DLS Representative to the APS March Meeting Symposia/Invited Talks Selection Committee, 1998
- ILS-XV Conference Sessioning Committee Member, 1999
- NSF Graduate Fellowship Evaluation Committee, Physics and Astronomy, 1996
- External Review Panel Interviewee, Texas Advanced Technology Program, 1994
- NSF Review Panels, 1992-2000 (more than 20)
- Reviewer for: Optics Letters, Optics Communications, Applied Physics Letters, Journal of Chemical Physics, Physical Review, Langmuir, Journal of Physical Chemistry B, Nano Letters, Nature Materials, Science, Advanced Materials, Journal of Biomedical Optics, Journal of the American Chemical Society, Proceedings of the National Academy of Science, Science

#### SELECTED ARTICLES ABOUT RESEARCH THAT HAVE APPEARED IN POPULAR PRESS AND TRADE JOURNALS:

- “Tiny ‘Malted Milk Balls’ have a way with light”, *Business Week Developments to Watch*, 5/3/1999.
- “Power and Influence: 22 people who will shape Luxury in 2001”, *The Robb Report*, January 2001.
- “The Science of Small”, *Forbes*, 2/5/2001.
- “Fantastic Nano-voyage”, *Business Week Developments to Watch*, 5/21/2001.

- “Gold Nanoshells may deliver drugs, detect HIV”, *Laser Focus World*, July 2001.
- “Big cures come in small packages”, *Discover Magazine*, September 2001.
- “Nanotechnology Changes Industries and Life”, *Technology Houston* 2001.
- “Near IR Nanoshells Weld Tissue”, *Biophotonics International*, June 2002.
- “Optical Properties of Nanoshells”, *Optics and Photonics News*, August 2002.
- “Laser Triggers Drug Release any time, any place”, *New Scientist*, 22 March 2003.
- “Bright New World”, *New Scientist*, 26 April 2003.
- “Nanoshell Sensors Improve Molecular Analysis”, *Chemical Engineering Progress*, April 2003.
- “Nanoshells: gifts in a gold wrapper”, *Nature Materials News and Views*, Vol. 2, May 2003.
- *Popular Science*, October 2003
- *Small Times*, Summer 2003 (Life Sciences issue)
- *Small Times*, September/October 2003 (Personal Profile)
- Discovery Channel, “Science Planet” TV Interview (aired in Canada and Europe 11/3/03)
- *C&E News*, April 19<sup>th</sup> issue, p. 35.
- “Dix Innovations qui vont changer la vie”, *Science et Vie*, April 2004.
- “Nano Weapons join the Fight against Cancer”, *Technology Review*, 4/30/04
- “Tiny is Beautiful: Translating ‘Nano’ into Practical”, *New York Times*, 2/22/2005
- NOVA ScienceNOW (TV show), April 19, 2005
- “Nanotech’s Big Future”, *National Geographic*, June 2006
- Esquire Magazine’s “Best and Brightest 2006”, December 2006
- “Remotely Activated Nanoparticles Destroy Cancer”, *MIT Technology Review*, 1/2/07 (<http://www.technologyreview.com/NanoTech/17956>)
- “Innovations” (PBS TV program sponsored by NAE, to air 2007)

#### BIBLIOGRAPHY:

##### Journal Articles:

1. N. J. Halas, S.-N. Liu, and N. B. Abraham, “Route to mode locking in a three-mode He-Ne 3.39 micron laser including chaos in the secondary beat frequency”, *Physical Review A* **28**, 2915-2920 (1983).
2. M.B. Ketchen, D. Grischkowsky, T.C. Chen, C-C. Chi, I.N. Duling III, N.J. Halas, J-M. Halbout, J.A. Kash, and G.P. Li, “Generation of Subpicosecond Electrical Pulses on Coplanar Transmission Lines”, *Applied Physics Letters* **48**, 751-753 (1986).
3. N.J. Halas and D. Grischkowsky, “Simultaneous Optical Pulse Compression and Wing Reduction”, *Applied Physics Letters* **48**, 823-825 (1986).
4. I.N. Duling, III, C-C. Chi, W.J. Gallagher, D. Grischkowsky, N.J. Halas, M.B. Ketchen, and A.W. Kleinsasser, “Propagation of Ultrashort Electrical Pulses on Superconducting Transmission Lines”, 110-113, in *Ultrafast Phenomena V*, eds. G. Fleming and A.E. Siegman, New York: Springer-Verlag (1986).
5. W. J. Gallagher, C-C. Chi, I.N. Duling, III, D. Grischkowsky, N. J. Halas, M.B. Ketchen, and A.W. Kleinsasser, “Subpicosecond Optoelectronic Study of Resistive and Superconductive Transmission Lines”, *Applied Physics Letters* **50**, 350-352 (1987).
6. N.J. Halas, D. Grischkowsky, and D. Krokkel, “An Ultrafast Light Controlled Optical Fiber Modulator”, *Applied Physics Letters* **50**, 886-888 (1987).
7. D. Grischkowsky, M.B. Ketchen, C-C. Chi, I.N. Duling, III, N.J. Halas, J-M. Halbout and P.J. May, “Capacitance-Free Generation and Detection of Subpicosecond Electrical Pulses on Coplanar Transmission Lines”, *IEEE Journal of Quantum Electronics* **24**, 221-225, (1988).
8. D. Krokkel, N.J. Halas, D. Grischkowsky, and G. Giuliani, “Dark Pulse Propagation in Optical Fibers”, *Physical Review Letters* **60**, 29-32 (1988).
9. L.T. Hudson, A.V. Barnes, N.J. Halas, R.F. Haglund, M.H. Mendenhall, P. Nordlander, N.H. Tolk, Y. Wang, and R.A. Rosenberg, “PSD of Excited Hydrogen from KCl”, in *Desorption Induced by Electronic Transitions (DIET III)*, eds. R.H. Stulen and M.L. Knotek, New York: Springer-Verlag, 274-277 (1988).
10. N.J. Halas and J. Bokor, “Surface Recombination on the  $S_i(111)2 \times 1$  Surface”, *Physical Review Letters* **62**, 1679-1682 (1989).

11. J. Bokor and N.J. Halas, "Time-Resolved Study of Silicon Surface Recombination", *IEEE Journal of Quantum Electronics* **25**, 2550-2555 (1989).
12. R. A. Cheville, W.B. Haynes and N. J. Halas, "Time-Resolved Reflectivity Studies of GaAs(100)/Oxide and GaAs(100)/ZnSe Interfaces", *Applied Physics Letters* **59**, 1476-1478 (1991).
13. R. A. Cheville and N. J. Halas, "Time-Resolved Carrier Relaxation in Solid C<sub>60</sub> Thin Films", *Physical Review B. Rapid Communications* **45**, 4548-4550 (1992).
14. R. A. Cheville, M. T. Reiten, and N. J. Halas, "Wide-Bandwidth Frequency Doubling with High Conversion Efficiency", *Optics Letters* **17**, 1343-1345 (1992).
15. H. Philips, D. Sarkar, R. Sauerbrey, and N. J. Halas, "Excimer Laser Induced Electrical Conductivity in C<sub>60</sub> Thin Films", *Applied Physics A* **57**, 105-107 (1993).
16. N. J. Halas, "Carrier Dynamics in Solid Fullerenes", in *Ultrafast Spectroscopy of Advanced Electronic and Optoelectronic Materials*, *SPIE Proceedings* **1861**, 333-342 (1993).
17. M. T. Reiten, R. A. Cheville, and N. J. Halas, "Second Harmonic Generation of T<sub>i</sub>: Sapphire Laser Radiation", invited article for the IEEE-LEOS newsletter, October 1993.
18. D. Sarkar and N. J. Halas, "Diffusion of Silver into Solid C<sub>60</sub> Thin Films", *Applied Physics Letters* **63**, 2438-2440 (1993).
19. J. A. Dura, P. M. Pippenger, N. J. Halas, X. Z. Xiong, P. C. Chow, and S. C. Moss, "Epitaxial Integration of Single Crystal C<sub>60</sub>", *Applied Physics Letters* **63**, 3443-3445 (1993).
20. D. Sarkar and N. J. Halas, "Dember Effect in C<sub>60</sub> Thin Films", *Solid State Communications* **90**, 261-265 (1994).
21. J. Resh, D. Sarkar, J. Kulik, J. Brueck, A. Ignatiev, and N. J. Halas, "Scanning Tunneling Microscopy and Spectroscopy with Fullerene Coated Tips", *Surface Science* **316**, L1061-L1067 (1994).
22. R. D. Averitt, J. M. Alford, and N. J. Halas, "High-Purity Vapor Phase Purification of C<sub>60</sub>", *Applied Physics Letters* **65**, 374-376 (1994).
23. M. T. Reiten, R. A. Cheville, and N. J. Halas, "Broad Bandwidth Frequency Doubling and Harmonic Generation of T<sub>i</sub>: Sapphire Laser Pulses," *SPIE Proceedings* **2116**, 25-34 (1994).
24. R. A. Cheville, R. D. Averitt, and N. J. Halas, "Ultrafast Large Dynamic Range Spectroscopy", *Optics Communications* **110**, 327-333 (1994).
25. M. T. Reiten, R. A. Cheville, and N. J. Halas, "Phase Matching and Focussing Effects in Noncollinear Sum Frequency Mixing in the Near VUV Region", *Optics Communications* **110**, 645-650 (1994).
26. N. J. Halas, V. Papanyan, R. D. Averitt, P. Pippenger, and R. A. Cheville, "Solvent Free High Purity Solid C<sub>60</sub>: Optical Properties", *Journal of Molecular Crystals and Liquid Crystals* **256**, 225-232 (1994).
27. R. D. Averitt, P. M. Pippenger, J. A. Dura, V. O. Papanyan, P. J. Nordlander, and N. J. Halas, "Photoluminescence Spectra of Epitaxial Single Crystal C<sub>60</sub>", *Chemical Physics Letters* **242**, 592-597 (1995).
28. T. Etheridge, R. D. Averitt, N. J. Halas, B. R. Weisman, "C<sub>60</sub> Triplet Lifetimes: Vibrational Energy Dependence from 0 to 10 eV", *Journal of Physical Chemistry* **99**, 11306-11308 (1995).
29. N. J. Halas, P. M. Pippenger, R. D. Averitt, V. O. Papanyan, J. A. Dura, and P. J. Nordlander, "Photoluminescence Spectra of Epitaxial Single Crystal C<sub>60</sub>: an Excimer Model", *SPIE Proceedings* **2530**, 30-40 (1995).
30. P. M. Pippenger, R. D. Averitt, V. O. Papanyan, J. A. Dura, P. J. Nordlander and N. J. Halas, "An Excimer Model for Photoluminescence in Single Crystal C<sub>60</sub>", *Journal of Physical Chemistry* **100**, 2854-2861 (1996).
31. K. F. Kelly, D. Sarkar, S. Prato, J. Resh, G. Hale, and N. J. Halas, "Direct Observation of Fullerene-Adsorbed Tips by STM", *Journal of Vacuum Science and Technology B* **14**, 593-596 (1996).
32. K. F. Kelly, G. Hale, D. Sarkar, and N. J. Halas, "Threefold Electron Scattering on Graphite Observed with C<sub>60</sub> Adsorbed STM Tips", *Science* **273**, 1371-1373 (1996).
33. K. F. Kelly, D. Sarkar, S. J. Oldenburg, G. D. Hale, and N. J. Halas, "Fullerene Tips for Scanning Probe Microscopy", *SPIE Proceedings* **2854**, 114-121 (1996).
34. K. F. Kelly, D. Sarkar, S. J. Oldenburg, G. D. Hale, and N. J. Halas, "Fullerene Functionalized Scanning Tunneling Microscope Tips-Preparation, Characterization and Applications", *Synthetic Metals* **86**, 2407-2410 (1997).
35. G. D. Hale, S. J. Oldenburg and N. J. Halas, "Observation of Triplet Exciton Dynamics in Conjugated Polymer Films Using Two-photon Photoemission", *Physical Review B: Rapid Communications* **55**, 16069-16071 (1997).
36. R. D. Averitt, D. Sarkar and N. J. Halas, "Plasmon Resonance Shifts of Au Coated Au<sub>2</sub>S Nanoshells: Insight into Multicomponent Nanoparticle Growth", *Physical Review Letters* **78**, 4217-4220 (1997).
37. D. Sarkar and N. J. Halas, "A General Vector Basis Function Solution of Maxwell's Equations", *Physical Review E* **56**, 1102-1112 (1997).

38. G. D. Hale, S. J. Oldenburg, and N. J. Halas, "Effects of Photo-oxidation on Conjugated Polymer Films", *Applied Physics Letters* **71**, 1483-1485 (1997).
39. S. Oldenburg, R. D. Averitt, S. Westcott, and N. J. Halas, "Nanoengineering of Optical Resonances", *Chemical Physics Letters* **288**, 243-247 (1998).
40. G. D. Hale, S. D. Oldenburg, and N. J. Halas, "Dynamics of Triplet Excitons in MEH-PPV Measured by Two-Photon Photoemission", *SPIE Proceedings* **3145**, 229-240 (1998).
41. K. F. Kelly and N. J. Halas, "Determination of Alpha-site and Beta-site Defects on a Graphite Surface", *Surface Science Letters* **416**, L1085-L1089 (1998).
42. S. Westcott, S. Oldenburg, T. R. Lee, and N. J. Halas, "Formation and Adsorption of Gold Nanoparticle-Cluster on Functionalized Silica Nanoparticle Surfaces", *Langmuir* **14**, 5396-5401 (1998).
43. R. D. Averitt, S. L. Westcott and N. J. Halas, "Ultrafast Electron Dynamics in Gold Nanoshells", *Phys. Rev. B. Rapid Communications* **58**, 10203-10206 (1998).
44. L. A. Porter, D. Ji, S. L. Westcott, M. Graupe, R. S. Czernuszewicz, N. J. Halas, and T. R. Lee, "Gold and Silver Nanoparticles Functionalized by the Adsorption of Dialkyl Disulfides", *Langmuir* **14**, 7378-7380 (1998).
45. S. L. Westcott, S. J. Oldenburg, T. R. Lee and N. J. Halas, "Construction of Simple Gold Nanoparticle Aggregates with Controlled Plasmon-Plasmon Interactions", *Chemical Physics Letters* **300**, 651-653 (1999).
46. J. G. Kushmerick, K. F. Kelly, H. P. Rust, N. J. Halas, and P. S. Weiss, "Observations of Anisotropic Electron Scattering on Graphite with a Low Temperature Scanning Tunneling Microscope", *Journal of Physical Chemistry B* **103**, 1619-1623 (1999).
47. D. B. Wolfe, S. J. Oldenburg, S. L. Westcott, Joseph B. Jackson, Mark S. Paley, and N. J. Halas, "Photodeposition of Molecular Layers onto Nanoparticle Substrates", *Langmuir* **15**, 2745-2748 (1999).
48. D. B. Wolfe, S. J. Oldenburg, S. L. Westcott, J. B. Jackson, M. S. Paley, N. J. Halas, "Preparation and Characterization of Polymer Coated Nanoparticles", *SPIE Proceedings* **3793**, 129-137 (1999).
49. Y. S. Shon, K. F. Kelly, N. J. Halas, and T. R. Lee, "Fullerene-terminated Alkanethiolate SAMs on Gold Generated from Unsymmetrical Disulfides", *Langmuir* **15**, 5329-5332 (1999).
50. S. J. Oldenburg, S. L. Westcott, R. D. Averitt, and N. J. Halas, "Surface Enhanced Raman Scattering in the Near Infrared using Metal Nanoshell Substrates", *Journal of Chemical Physics* **111**, 4729-4732 (1999).
51. S. J. Oldenburg, G. D. Hale, J. B. Jackson, and N. J. Halas, "Light Scattering from Dipole and Quadrupole Nanoshell Antennas", *Applied Physics Letters* **75**, 1063-1065 (1999).
52. R. D. Averitt, S. L. Westcott, and N. J. Halas, "The Linear Optical Properties of Gold Nanoshells", *Journal of the Optical Society of America B* **16**, 1824-1832 (1999).
53. R. D. Averitt, S. L. Westcott, and N. J. Halas, "The Ultrafast Optical Properties of Gold Nanoshells", *Journal of the Optical Society of America B* **16**, 1814-1823 (1999).
54. K. F. Kelly, Y. S. Shon, T. R. Lee, and N. J. Halas, "Scanning Tunneling Microscopy and Spectroscopy of Dialkyl Disulfide Fullerenes Inserted into Alkanethiol SAMs," *Journal of Physical Chemistry B* **103**, 8639-8642 (1999).
55. W. T. Chiang, K. F. Kelly, C. Radloff, R. H. Hauge, E. T. Mickelson, J. L. Margrave, X. Wang, G. E. Scuseria, and N. J. Halas, "STM Images of Sidewall Fluorinated SWNTs", *Chemical Physics Letters* **313**, 445-450 (1999).
56. Steven J. Oldenburg, Joseph B. Jackson, Sarah L. Westcott, and N. J. Halas, "Infrared Extinction Properties of Gold Nanoshells", *Applied Physics Letters* **75**, 2897-2899 (1999).
57. J. West and N. J. Halas, "Applications of Nanotechnology to Biotechnology", invited article for *Current Opinions in Biotechnology* **5**, 215-217 (2000).
58. Scott Sershen, Sarah Westcott, N. J. Halas, and J. West, "Temperature-Sensitive Polymer-Nanoshell Composite for Photothermally Modulated Drug Delivery", *Journal of Biomedical Materials Research* **51**, 293-298 (2000).
59. K. F. Kelly, E. T. Mickelson, R. H. Hauge, J. L. Margrave, and N. J. Halas, "Nanoscale Imaging of Chemical Interactions: Fluorine on Graphite", *Proceedings of the National Academy of Sciences* **97**, 10318-10321 (2000).
60. D. D. Smith, L. Sibille, R. Cronise, S. Oldenburg, D. Wolfe, and N. J. Halas, "The Effect of Microgravity on the Growth of Silica Nanoparticles", *Langmuir* **16**, 10055-10060 (2000).
61. G. D. Hale, T. R. Lee, J. Jackson and N. J. Halas, "Enhancing the Active Lifetime of Luminescent Semiconducting Polymers via Doping with Metal Nanoshells", *Applied Physics Letters* **78**, 1502-1504 (2000).
62. J. B. Jackson and N. J. Halas, "Silver Nanoshells: Variations in Morphologies and Optical Properties", *Journal of Physical Chemistry B* **105**, 2743-2746 (2001).
63. C. Radloff and N. J. Halas, "Enhanced Thermal Stability of Silica-Encapsulated Metal Nanoshells", *Applied Physics Letters* **79**, 674-676 (2001).
64. S. L. Westcott, R. D. Averitt, J. Wolfgang, P. J. Nordlander, and N. J. Halas, "Adsorbate-Induced Quenching of Hot Electrons in Gold Core-Shell Nanoparticles", *Journal of Physical Chemistry B* **105**, 9913-9917 (2001).

65. S. Sershen, S. L. Westcott, J. L. West, and N. J. Halas, "An Opto-Mechanical Nanoshell-Polymer Composite", *Applied Physics B* **73**, 379-381 (2001).
66. C. Moran, and N. J. Halas, "Synthesis and Preparation of Silica Nanoparticles with Rare Earth Dopants", *Langmuir* **17**, 8376-8379 (2001).
67. S. L. Westcott, C. Aguirre, K. Bradley, and N. J. Halas, "Electron Relaxation Dynamics in Semicontinuous Metal Films on Nanoparticles", *Chemical Physics Letters* **356**, 207-213 (2002).
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131. J. B. Lassiter, C. Nehl, J. Hafner, D. Brandl, P. Nordlander and N. J. Halas, "Plasmonic properties of Nanoshell homodimers and heterodimers", manuscript in preparation.
132. J. Kundu, H. Wang, G. Goodrich, and N. J. Halas, "Surface Enhanced Infrared Absorption Spectroscopy (SEIRA) using infrared resonant nanoshell aggregate substrates", manuscript in preparation.
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134. N. Lwin, J. Dumoit, N. Grady, H. Wang, and N. J. Halas, "Stepwise fabrication of plasmonic heterodimers and their properties", manuscript in preparation.
135. N. Mirin, B. Lassiter, P. Nordlander, and N. J. Halas, "Plasmonic properties of individual nanoholes", manuscript in preparation.
136. H. Wang and N. J. Halas, "Plasmonic meatballs", manuscript in preparation.
137. A. Barhoumi, O. Neumann, B. Janesko and N. J. Halas, "SERS of DNA conformers: spectral evidence of molecular conformation", manuscript in preparation.
138. O. Neumann, A. Barhoumi, and N. J. Halas, SERS-based label free aptamer sensing, manuscript in preparation.
139. J. Liao, C. S. Levin, N. J. Halas and R. Raphael, "Lipid bilayer coated metallic nanoshells for surface enhanced Raman spectroscopy of membranes", manuscript in preparation.
140. S. Priya Sundararajan, N. K. Grady, and N. J. Halas, "Photocurrent modifications in semiconductor diodes induced by plasmonic nanoparticle antennas", manuscript in preparation.

141. M. Knight, N. Grady, F. Hao, P. Nordlander and N. J. Halas, "Plasmonic conversion of light into nanowire plasmons by adjacent nanoparticles", manuscript in preparation.
142. N. Fofang and N. J. Halas, "Plasmon-exciton coupling regimes in a nanoparticle-based system", manuscript in preparation.
143. S. Lal and N. J. Halas, "Surface Enhanced Spectroscopy with controlled electromagnetic nanoenvironments", invited review article for Chemical Society Reviews, manuscript in preparation.
144. S. Link and N. J. Halas, "Plasmonics", invited article for Nature Photonics, manuscript in preparation.
145. N. J. Halas, "Nanoparticle applications in cancer diagnostics and therapeutics", invited article for Reports on the Progress of Physics, manuscript in preparation.

#### Book Chapters:

1. Corey Radloff, Cristin Moran, Joseph Jackson, and N. J. Halas, "Nanoparticles: Building Blocks for Functional Nanostructures" in *Molecular Nanoelectronics*, ed. Mark Reed and Takhee Lee, American Scientific Publishers, 2003.
2. Chen, J., Lin, A., Loo, C., Hsu, K., West, J., Halas, N., and Drezek, R., "Emerging Optical Technologies for Functional and Molecular Imaging", in *Advances in Diagnosis and Therapy of Breast Disease*, ed. Eva Singletary, in press.
3. L. R. Hirsch, N. J. Halas, and J. L. West, "A Whole Blood Immunoassay facilitated by Gold Nanoshell-conjugate Antibodies", *Bionanotechnology Protocols (Methods in Molecular Biology)*, eds. Sandra Rosenthal and David W. Wright (2003).
4. Loo, C., Hirsch, L., Halas, N., West, J., and Drezek, R., "Diagnostic and Therapeutic Applications of Nanoshells", in *Nanofabrication for Biomedical Applications*. Hormes, Kumar and Leuschner (Eds). Wiley, in press (2004).
5. Hirsch, L., Drezek, R., Halas, N., and West, J., "Biomedical Applications of Nanoshells", in *Encyclopedia of BiMEMs and Bionanotechnology*, Tejal Desai and Sangeeta Bhatia (eds). Kluwer, in press (2004).
6. J. Steele, N. Grady, P. Nordlander, and N. J. Halas, "Plasmon Hybridization in Complex Nanostructures", in *Plasmonics and Nanophotonics*, Mark Brongersma (ed) in press (2005).

#### Technical Reports:

1. R. Averitt, M. Alford and N. J. Halas, "Solvent-free High Purity Method for Mass-Selected Separation of Fullerenes", Technical Report 93-03, Rice University Department of Electrical and Computer Engineering.
2. K. F. Kelly, S. Prato, J. Resh, D. Sarkar, J. Hovis, and N. J. Halas, "Imaging Fullerene Nanotips", Technical Report 95-06, Department of Electrical and Computer Engineering.
3. D. Sarkar and N. J. Halas, "Vector Basis Function Solution of Maxwell's Equations", Technical Report 97-01, Department of Electrical and Computer Engineering.
4. J. B. Jackson, S. J. Oldenburg, S. L. Westcott, and N. J. Halas, "Fabrication of Silver Nanoshells", Technical Report 98-10, Department of Electrical and Computer Engineering.
5. Daniel B. Wolfe, Steven J. Oldenburg, Joseph B. Jackson, Jennifer L. West, and N. J. Halas, "Preparation and Characterization of Enzyme/Nanoshell Conjugates", Technical Report 99-05, Department of Electrical and Computer Engineering.

#### Invited Talks:

1. "Photoconductive Generation of Subpicosecond Electrical Pulses and their Measurement Applications", Picosecond Electronics and Optoelectronics Conf., January 1987.
2. "Probing Superconductors with Ultrashort Laser Pulses", IQEC 1987, April 1987.
3. "Study of Surface Recombination using Time-Resolved Photoemission", Proceedings of the Short Wavelength Coherent Radiation Conference, North Falmouth, MA, September 1989.
4. "Depletion Region Carrier Dynamics at GaAs Interfaces", Chalmers University, Goteborg, Sweden, December 1990.
5. "Time-Resolved Relaxation Processes in Solid C<sub>60</sub>", Physics Colloquium, The University of Houston, Houston, TX, November 1991.
6. "Time-Resolved Carrier Dynamics Studies in Solid C<sub>60</sub>", Physics Colloquium, Bryn Mawr College, Bryn Mawr, PA, December 1991.

7. "Time-Resolved Carrier Relaxation in Solid C<sub>60</sub>", Research Seminar, Vanderbilt University, March 1992.
8. "Slow Relaxations in the Solid Phase of C<sub>60</sub>", Physics Department, Texas A&M University, College Station, TX, May 1992.
9. "Time-Resolved Optical Measurements of Carrier Dynamics in C<sub>60</sub>", Research Seminar, Freie Universitet, Berlin, FRG, June 1992.
10. "Optical Measurements of Slow Relaxation Decays in Solid C<sub>60</sub>", Research Seminar, Physics Department, Rutgers University, Piscataway, NJ, July 1992.
11. "Carrier Dynamics in Solid C<sub>60</sub>", OELase, Los Angeles, CA, January 1993.
12. "Properties and Potential Applications of Fullerene Solids", Research Colloquium, Department of Mechanical Engineering and Materials Science, Rice University, September 1993.
13. "Fullerenes: Dynamical Properties and Potential Applications", Physics Department, Sam Houston State University, September 1993.
14. "Properties and Potential Applications of Fullerene Solids", Office of Naval Research Free Electron Laser Program Review, Nashville, TN, October 1993.
15. "Broad Bandwidth Frequency Doubling and Harmonic Generation of T<sub>i</sub>: Sapphire Laser Pulses", SPIE meeting, OE/Lase, Los Angeles, CA, January 1994.
16. "Imaging Fullerene Nanotips", American Physical Society Meeting, Texas Section, Austin, TX, October 1994.
17. "Photoluminescence in Single Crystal C<sub>60</sub>: an Excimer Model", SPIE Annual meeting, San Diego, CA, July 1995.
18. "Fullerene STM Tips", Electrochemical Society Meeting, Los Angeles, CA, May 1996.
19. "Imaging Electron Scattering with Fullerene STM Tips", Physics Department and Materials Research Society Colloquium, Texas A&M University, College Station, Texas, May 1996.
20. "Fullerene STM Tips: Preparation and Imaging Applications," NASA Marshall Space Flight Center, Huntsville AL, June 1996.
21. "Imaging Electron Scattering at Graphite Point Defects using Fullerene STM Tips", Texas Section of the American Physical Society Meeting, Arlington, TX, October 1996.
22. "Fullerene Functionalized Scanning Tunneling Microscope Tips: Preparation, Characterization, and Applications", International Conference on Synthetic Metals, Salt Lake City, UT July 1996.
23. "Preparation, Characterization and Imaging Applications of C<sub>60</sub> STM Tips", SPIE Annual Meeting, Denver, CO, August 1996.
24. "Molecular STM Tips", invited talk at the American Physical Society March Meeting, Frontiers in Physics Session, Kansas City, MO, March 1997.
25. "Topics in Nanoengineering", East Texas Regional AIChE Meeting, Beaumont, TX, April 1997.
26. "Molecular Nanoprobes and Metal Nanoshells", Physics Department, University of Pittsburgh, Pittsburgh, PA, April 1997.
27. "Two-Photon Photoemission Spectroscopy of Triplet Excitons in MEH-PPV Films", Johannes Kepler Universitat, Linz, Austria, May 1997.
28. "Fullerene Nanoprobes and Metal Nanoshells", IBM Rushlikon Laboratory, Zurich, Switzerland, May 1997.
29. "Imaging of Point Defects on Graphite Surfaces with Molecular STM Tips", LCAM, U. Paris-Sud, Orsay, France, May 1997.
30. "Properties and Applications of Metal Nanoshells and their Composite Solids", Solid State and Surface Chemistry Workshop, Office of Naval Research, Arlington, VA, October 1997.
31. "The Designer Resonances of Metal Nanoshells", 1998 Cluster Workshop, National Institute for Advanced Interdisciplinary Research (Yu-go-ken), Tsukuba, Japan, January 1998.
32. "Femtosecond Electron Dynamics in Gold Nanoshells", American Physical Society Meeting, Los Angeles, CA, March 1998.
33. "Nanoengineering: from Science Fiction to Real World Solutions", The Dean's Series, School of Continuing Studies, Rice University, Houston, TX, April 1998.
34. "Functional Nanostructures", Physical Chemistry Research Seminar, University of Houston, Houston, TX, November 1998.
35. "STM with Functionalized Tip and Metal Nanoshells", Condensed Matter Physics Seminar, University of Texas, April 1999.
36. "Fabrication, Properties and Terahertz Applications of Metal Nanoshells", ECE Department, Oklahoma State University, July 1999.
37. "Nanoshell-Based Infrared and Terahertz Adaptive Materials and Devices", Army Research Laboratory, Aberdeen, MD, July 1999.

38. "Nanoshell-Based Infrared and Terahertz Adaptive Materials and Devices", Department of Defense Research and Engineering (DDR&E), Institute for Defense Analyses, Alexandria, VA, July 1999.
39. "Current Status and Future Trends in Near Field and Scanning Microscopies", overview talk, NAS sponsored 2<sup>nd</sup> annual Japan-American Frontiers of Science Symposium (JAFOS), Tsukuba, Japan, October 1999.
40. "Metal Nanoshells", Graduate Research Seminar, ECE Department, Purdue University, October 1999.
41. "Nanotips and Nanoshells", Chemistry Colloquium, Rice University, October 1999.
42. "Metal Nanoshells: Properties and Interactions", Texas Section of the American Physical Society, University of Texas at Austin, October 1999.
43. "Oxidation Inhibition in Conducting Polymers-Gold Nanoshell Composites", Optical Probes 2000, Salt Lake City, UT, February 2000.
44. "Tailoring Novel Materials Properties with Composite Nanoparticles", Mechanical Engineering and Materials Science Department, Rice University, February 2000.
45. "Nanoengineering of Optical Properties: Applications and Commercialization of Metal Nanoshells", Commercialization of Nanostructured Materials, Orlando, Florida, April 2000.
46. "Nanoshells and Applications", Colloquium, Materials Science Department, Northwestern University, April 2000.
47. "Effects of Microgravity on Nanoparticle Growth", NASA Microgravity Conference, Huntsville, AL, June 2000.
48. "Metal Nanoshell-polymer Composites: Changing the Properties of Functional Materials", International Conference for Synthetic Metals, Bad Gastein, Austria, July, 2000.
49. "The Nanoscience of Color: Properties and Applications of Metal Nanoshells", Bryn Mawr College, Bryn Mawr, PA, November 2000.
50. "Metal Nanoshell-Polymer Composites", ACS Regional Meeting, New Orleans, LA, December 2000.
51. "Nanoengineering Optical Properties with Metal Nanoshells: New Materials and Applications", University of Arizona Optical Sciences Center, Tucson, AZ, March 2001.
52. "Metal Nanoshells: Materials Applications of Designer Nanoparticles", Materials Science Seminar, University of Washington, Seattle, WA, March 2001.
53. "The Nanoengineering of Optical Properties: New Materials and Applications in Biotechnology", Department of Electrical Engineering, University of Texas, Austin, TX, March 2001.
54. "Metal Nanoshells: Surface Chemistry and Dynamics", Electrochemical Society Meeting, Washington, D.C., March 2001.
55. "Metal Nanoshells: Light Scattering Properties and their Applications Towards Sensor Protection", DOD Sensor Protection Workshop, Army Research Laboratory, Adelphi, MD, March 2001.
56. "Metal Nanoshells and the Rest of the Universe", Rice University Research Seminar, Chemistry Department, April 2001.
57. "The Nanoengineering of Optical Properties using Metal Nanoshells", Lawrence Livermore National Laboratory, Materials Research Institute Seminar, April 2001.
58. "Metal Nanoshells: Frequency Agile Optical Properties and Applications", U. S. Air Force Research Laboratory, Wright Patterson AFB, Dayton, OH, May 2001.
59. "Metal Nanoshells: Shaping the Flow of Light One Nanoparticle at a Time", Research Colloquium, University of California, Riverside, CA, May 2001.
60. "Metal Nanoshells: a Photonic Approach to Nanobiotechnology", IBC Conference on Nanobiotechnology, San Diego, CA, July 2001.
61. "Nanotechnology and its Emerging Capabilities", NCI sponsored workshop, NIST, Gaithersburg, MD, August 2001.
62. "Metal Nanoshells and Their Applications at the Nano-Bio Interface", Red Herring Conference, Boston, MA, September 2001 (cancelled due to September 11 attacks).
63. "Metal Nanoshells: Shaping the Flow of Light One Nanoparticle at a Time", ECE Colloquium, Cornell University, September 2001.
64. "Metal Nanoshells: Manipulating the Flow of Light at the Nanoscale", Photonic Nanostructures Conference, Knowledge Foundation, San Diego, CA, October 2001.
65. "Properties of Metal Nanoshells", 3M Corporation, St. Paul, MN, October 2001.
66. "Nanotechnology for the Real World", Brother Lucian Blersch 2<sup>nd</sup> Annual Science Symposium, St. Edwards University, San Antonio, TX, Feb 2002.
67. "Metal Nanoshells: Constructing optics "from the dipole up", Interdisciplinary Materials Science Graduate Program Colloquium, Vanderbilt University, Nashville, TN, April 2002.

68. "Nanoshells: Nanotechnology for the Real World", Third Annual St. Olaf Honors Day Science Symposium- "Big Questions, Small Scale Solutions: New Frontiers in Nanoscience", Northfield, Minnesota, May 2002.
69. "From Nanoshells to Nanospectra: a Rice-founded technology", Luncheon for the spouses of the Trustees of Rice University, May 2002.
70. "Tuning optical properties at the Nanoscale", DAMOP May 28<sup>th</sup>-June 1<sup>st</sup>, 2002.
71. "Biophotonic applications of Metal Nanoshells", Gordon Research Conference, "Lasers in Biology and Medicine", July 2002.
72. "The Manipulation of Light one Nanoparticle at a time", ETOPIIM Conference, Snowbird, UT, July 2002.
73. "Nanoshells: bio-inspired architectures for multifunctional coatings", ARL/AFRL Meeting on Multifunctional Coatings, Keystone, CO, August 2002.
74. "Nanoshells: a Photonic approach to Nanobiotechnology", Texas Nano-Vivo Summit, Houston, TX, August 2002.
75. "Nanoshells: fabricating nanophotonics 'from the dipole up'", IEEE-Nanophotonics Colloquium, 2<sup>nd</sup> Annual IEEE Conference on Nanotechnology, August, 2002.
76. "Biomedical Applications of Gold Nanoshells", 3<sup>rd</sup> Annual Bio-MEMS Conference, Columbus, OH, September 2002.
77. MURI Site visit, Army Research Laboratory, September 11, 2002.
78. "Plasmonic Hybridization: Design Principles and Realization of Nanophotonic Architectures", Physical Foundations of Quantum Electronics, Snowbird, UT, January 2003.
79. "Plasmonic Hybridization: Design Principles and Realization of Nanophotonic Architectures", Research Seminar, University of Florida, January 2003
80. "Plasmonic Nanoparticles by Rational Design", University of Georgia, January 2003
81. "Plasmon hybridization: a Design Principle for the Realization of Practical Nanophotonic Architectures", Georgia Tech, January 2003
82. "Plasmon Hybridization: a rational design principle for nanophotonic architectures" Imperial College, UK, February 2003
83. Third International Conference on Biomimetic Materials Processing, BMMP-3; Nagoya, JP, January 26-30.
84. "Plasmonics: Rationally Designed Architectures for Optics at the Nanoscale", Visit and Colloquium at Sandia National Laboratory
85. "Plasmonics: Rationally Designed Architectures for Optics at the Nanoscale", Visit and Colloquium at Los Alamos National Laboratory
86. "Plasmonic Hybridization: Design Principles and Realization of Nanophotonic Architectures", Australian Colloid and Interface Science 2003 meeting, Sydney, February 2003
87. "Nanoshells: using Tunable Plasmons for Nanobiotechnology", Australian Nano-Bio meeting, Melbourne, February 2003
88. "Plasmonic Nanostructures and their Applications in Biosensing", American Chemical Society meeting, March 2003
89. "Plasmonic Nanostructures by Rational Design", American Physical Society Meeting, March 2003
90. "Plasmon Hybridization: a design principle for the realization of practical nanophotonic architectures", James Franck Institute Colloquium, University of Chicago, April 22<sup>nd</sup>, 2003
91. "Plasmon Nanostructures: Applications in Biotechnology", Vanderbilt Student Invited Pharmacology Speaker, April 24, 2003.
92. University of Texas-Dallas, May 3, 2003 (postponed until 2004)
93. Nanotech to Biotech Convergence, May 4-6, 2003 (declined).
94. "Plasmonics: Manipulation of electromagnetic fields at the nanoscale", AFOSR Contractor's meeting, San Diego, CA, May 18-22, 2003
95. "Nanoshells: an Ideal Nano-Bio Interface for Biomedical Applications", Research Seminar, M. D. Anderson Cancer Center, June 2003
96. "Photothermal Effects Induced on and by Plasmonic Nanostructures", Gordon Research Conference on Photothermal and Photoacoustic Phenomena, Colby-Sawyer College, NH, June 2003
97. "Nanoshells: an Ideal Nano-Bio Interface for Biomedical Applications", AAMI Annual Meeting (American Association for Medical Instrumentation), Long Beach, CA, June 15, 2003
98. "Plasmonic Nanostructures by Rational Design", Gordon Research Conference on Electronic Spectroscopy and Dynamics, July 2003
99. "Plasmonics: an Emerging Optical Nanotechnology", First Annual SPRING meeting, Austin, TX, August 25-27.

100. "Optimizing Surface Enhanced Raman Scattering with Ag Nanoshells" J. B. Jackson and N. J. Halas, SPIE Conference, San Diego, CA, August 2003.
101. "Plasmonics: manipulating electromagnetic fields at the nanoscale", Duke University, ECE Seminar, September 2003
102. "The Remarkable Optical Properties of Gold Nanoshells", Gold 2003: Industrial Applications of Gold, International Conference, Vancouver, BC, September 2003
103. "Tunable Plasmonic Nanostructures: biosensing relevant properties and applications", Biomedical Engineering Society (BMES) Annual Meeting, Nashville, TN, September 2003
104. "Plasmonics: Nanoscale Manipulation of the Plasmon Response", Progress in Electromagnetic Research Symposium (PIERS2003), Honolulu, Hawaii, October 2003
105. "Optics at the Nanoscale: Design Principles, Components and Applications", Nanotechnology Symposium, Dartmouth College, November 2003
106. "Plasmonic nanostructures: Optical design at nanoscale dimensions", International Symposium on Clusters and Nano-Assemblies (ISCANA), Virginia Commonwealth University, November 2003 (Plenary talk)
107. "Tunable Plasmonic Nanostructures: Fundamental Components for Nano-Optics", Physics of Quantum Electronics 2004, Snowbird, UT, January 2004.
108. "Nanoshells: Tunable plasmonic nanoparticles with applications in biotechnology", Inaugural Meeting of the Texas Academy of Science, Engineering and Medicine (TASEM), San Antonio, TX, January 2004.
109. "Nanophotonics in Silica/Gold Nanoshells", Contemporary Photonics Technology 2004, Tokyo, Japan, January 2004
110. "Nanoshells: Optical Design at Nanoscale Dimensions", Research Seminar, Nanophotonics Laboratory, Professor Satoshi Kawata, University of Tokyo, Japan, January 2004.
111. Plenary Talk, 3<sup>rd</sup> Annual Rice Alliance Nanotechnology Innovation Forum, Rice University, January 2004 (declined due to conflict).
112. SPIE Biophotonics Meeting, "Plasmonic Applications in Biomedicine", (talk declined, Rebekah Drezek suggested as substitute speaker to present nanoshell-related work).
113. "Plasmon Hybridization: a Design Principle for the Realization of Practical Nanophotonic Architectures", Physics Department Colloquium, University of Colorado, January 2004
114. "Nanoshells: design rules and chemical fabrication of tunable nanophotonic components", Chemistry Department and IGERT Seminar, University of Oregon, February 2004
115. IEEE Nanoscale Devices and Systems Integration, Orlando, FL, February 2004 (declined due to conflict)
116. "Nanoshells: Fundamental Plasmonic nanocomponents with Real-world Applications" Research Seminar, Zyvex Corp. (televised), Dallas, TX, February 2004.
117. "Nanoshells: Optical Design at Nanoscale Dimensions", Physics Colloquium at Trinity University, San Antonio, TX, February 2004.
118. "Nanoshells: fundamental topologies and design principles for nano-optics", Physics Colloquium, Rice University, Houston, TX, March 2004.
119. Plenary talk, 113rd TMS Annual Meeting (Minerals, Metals and Materials), Charlotte, NC, March 2004 (declined due to travel conflict)
120. PIERS2004 Annual Meeting, Pisa, Italy, March 2004 (talk presented by Glenn Goodrich).
121. "Nanoshells: New tools for manipulating light at the nanoscale", Nanotech 2004 Conference, Tokyo, Japan, March 2004 (Plenary talk)
122. "Nanoshells: New tools for manipulating light at the nanoscale", NAE Regional Meeting, Rice University, March 2004.
123. "Nanoshells as Multimodality nanoscale sensors", 2004 ACS National Meeting, Anaheim, CA March, 2004.
124. "Plasmonic Nanoparticles by Rational Design", 2004 ACS National Meeting, Anaheim, CA, March 2004.
125. "Tailoring the near field for enhanced spectroscopies below the diffraction limit", 2004 ACS National Meeting, Anaheim, CA, March 2004.
126. Workshop on Nano-scale Materials: From Science to Technology, Institute of Physics, Bhubaneswar, India during April 5-8, 2004 (declined).
127. "Tailoring nanostructures for enhancing spectroscopies below the diffraction limit", MRS Spring Meeting, San Francisco, CA April 2004.
128. "Rational Design of Plasmonic Nanoarchitectures", MRS Spring Meeting, San Francisco, CA April 2004
129. "Symmetry Breaking in Synthesis and Post-synthetic Processing of Nanoshells", MRS Spring Meeting, San Francisco, CA April 2004
130. ACI Nanobiotechnology Conference, San Francisco, CA, April 2004 (declined due to conflict).

131. "Nanoshells: using Nanotechnology to harvest light for Biomedicine", Benson Lecturer, Physics Department, Miami University, April 2004 (Public Lecture).
132. "Plasmonic Nanostructures by Rational Design", Benson Lecturer, Physics Department, Miami University, April 2004 (Physics Colloquium).
133. "Nanoshells: Tunable Plasmonic Nanostructures by Rational Design", Women in Science and Engineering Distinguished Lecture and Physics Colloquium, Kansas State University, Manhattan, Kansas, April 2004.
134. "Nanoshells: applications of Plasmonic Nanostructures in Biomedicine" NIH/NIAID Workshop, Gaithersburg, MD, June 2004.
135. "Nanoshells: Nanoscale Manipulation of the Plasmon Response", EMRS (European Materials Research Society), Strasbourg, France, May 2004.
136. "Nanoshells: from plasmon physics to cancer therapy", Research Seminar, Chalmers University, Goteborg, Sweden, June 2004.
137. Association of Academic Health Centers, Council on Research and Science, Washington, DC (declined due to conflict).
138. Frontiers in Laser Physics, Trieste, IT, July 14-16, 2004.
139. "Photonics from the Bottom Up: Design Tools for Manipulating Light at the Nano Scale", Chemistry and Physics of Nanostructure Fabrication, Gordon Research Conference, Tilton, NH, July 18-23, 2004.
140. Invited talk, Nanophotonics Conference, Osaka, Japan, July 2004.
141. Invited talk, SPIE Annual Meeting, Denver, CO, August 2004.
142. "Biosensing Applications of Nanoshells", Becton-Dickinson, Inc., Durham, NC, September 2004.
143. Keynote Address, Chips to Hits Meeting, Boston, MA, September 2004.
144. "Truth and Beauty at the Nanoscale: Texas-Sized Molecules and Cancer Therapy", Houston Philosophical Society, September 2004.
145. "Nanoshells: New tools for manipulating light at the nanoscale", Nanotechnology Workshop, Venice, Italy, September 2004.
146. "Nanoshells: Tunable plasmonic nanostructures and applications", UC Davis, Department of Biomedical Engineering, October 2004 (postponed until 2005).
147. US-Israel Workshop in Nanoscience, Washington, DC, October 2004 (workshop postponed until 2005).
148. "SERS based Nanosensing", Air Force Review Guest Speaker, Wright-Patterson Air Force Base, November 2004.
149. AVS National Meeting, Anaheim, CA, November 2004.
150. IUMRS Meeting, Taiwan, November 2004 (declined due to conflict).
151. "Nanoshells: manipulation of light at nanoscale dimensions" NSF sponsored Nanoscience Symposium in Hong Kong, November 2004.
152. "Plasmons: Manipulation of Light at the Nanoscale", Materials Research Society Annual Fall Meeting, Boston, Mass, November 2004.
153. "Nanoshells in Biomedical Applications", U. T. M. D. Anderson Imaging Physics Research Seminar, Houston, TX, November 2004.
154. "Nanoshells: manipulating light at nanoscale dimensions for biomedicine", University of Texas Center for Biomedical Engineering Annual Conference, Westin, Galleria, Houston, TX, December 2004.
155. "Plasmonic Nanosensors", NSF-NIRT Annual Meeting, National Science Foundation, Washington, DC, December 2004.
156. "Plasmonic Nanodevices", Physics of Quantum Electronics Conference, Snowbird, UT, January 2005.
157. Fifth International Symposium on Biomimetic Materials Processing (BMMP-5), Nagoya University, Nagoya, Japan, January 2005 (declined)
158. "Nanoshells and Quantum Dots"; Featured Speaker, Saturday Night Hot Topics, Photonics West SPIE Meeting, San Jose, CA, January 2005.
159. "Nanoshell-based Raman sensing of biologically relevant molecules and biomaterials", Photonics West SPIE Meeting, San Jose, CA, January 2005.
160. Nanotechnology in Biomedicine, University of Bielefeld, Germany, January 2005 (declined).
161. "Nanoshells in Biomedicine", AIChE Regional Meeting, Beaumont, TX, February 2005.
162. "A Plasmonic Approach to Nanophotonics", Research Colloquium, Boston University, Boston, MA, February 2005.
163. "Nanoshells: manipulation of light at nanoscale dimensions", Harvard/MIT Physical Chemistry Seminar Series, MIT, Cambridge, MA, February 2005.

164. "Plasmonics: Optical Nanostructures by Rational Design", Distinguished Scientist Lecture Series, Trinity University, San Antonio, TX, February 21<sup>st</sup>, 2005 (technical lecture).
165. "Nanoshells: using nanotechnology to harvest light for biomedicine", Distinguished Scientist Lecture Series, Trinity University, San Antonio, TX, February 21<sup>st</sup>, 2005 (popular lecture).
166. "Nanoshells: optimizing nanophotonic properties for probing living systems", ACS National Meeting, March 2005.
167. "Nanoshells: from plasmon physics to cancer therapy", IBM Almaden Research Colloquium, March 18<sup>th</sup>, 2005.
168. "All-Optical Nanosensors based on 'Controlled SERS'", IEEE NDSI 2005 Meeting, Houston, TX, March 2005.
169. "Nanoengineering Energy Solutions: a 'reductionist' approach", DARPA workshop on Nanopower, March 2005.
170. "Taming SERS with Tunable Plasmons", Chemistry Department, Penn State University, April 2005.
171. "Taming SERS with Tunable Plasmons", DOE Workshop on Single Molecule and Single Particle Spectroscopy, Gaithersburg, MD, April 2005.
172. "Plasmonics: Optics at the Nanoscale", Weissberger-Williams Lecture Series, Kodak, Rochester, NY, April 2005.
173. Invited talk, Foundations of Nanoscience Conference, Snowbird, UT, April 2005 (declined).
174. "Nanoshells: from plasmon physics to cancer therapy", NIST Colloquium Series, April 2005.
175. "Plasmonics: Optics at the Nanoscale", Departmental Colloquium Speaker, Institute of Optics, University of Rochester, April 2005.
176. Invited Speaker, MRS Spring Meeting, April 2005 (two invited talks).
177. Invited Speaker, ICONO-05, St. Petersburg, Russia, May 2005 (declined).
178. Invited Speaker, Symposium in Quebec, May 2005. (cancelled due to illness)
179. Plenary Speaker, 13<sup>th</sup> Annual Advocacy Training Conference, National Breast Cancer Coalition Fund, Washington DC, May 2005. (cancelled due to illness)
180. "Design and Implementation of a Standalone Raman-based All-optical Nanosensor", Quantum Electronics and Laser Science Conference (QELS), Baltimore, May 2005.
181. "Nanoshells: applying Nanotechnology to harvest light for biomedicine" at "Minds without Borders: Frontiers in Medical Research", Medical Sciences Graduate Student Association, University of Calgary, Calgary, Alberta, Canada, May 2005.
182. "Nanoshells: Seamless Integration of Cancer Imaging and Therapy", Era of Hope Conference, Philadelphia, PA, June 2005.
183. "Plasmon Hybridization: mesoscopic quantum analogs of atomic and molecular systems", Gordon Research Conference on Atomic and Molecular Physics, June 2005.
184. "Plasmon Hybridization: manipulating electromagnetic fields with mesoscale structures", MSS-12, Albuquerque, NM, July 2005.
185. "SERS-active Substrates by Rational Computational Design", DARPA MTO Workshop, San Francisco, CA, July 2005.
186. "Nanophotonics: harnessing light at the nanoscale", Nano Summit, Houston, TX, July 2005.
187. "Nanophotonics and Plasmon Hybridization: manipulating optical fields with nanoscale structures", Gordon Research Conference on Nanoparticles and Nanocrystals, Connecticut College, July 2005.
188. "The role of nanoscale roughness on the optical properties of plasmon resonant nanoparticles", SPIE Annual Meeting, San Diego, CA, August 2005.
189. "Nanoengineered Plasmonic Substrates for Surface Enhanced Spectroscopies", ICAVS-3 Third International Conference on Advanced Vibrational Spectroscopy, Delavan, WI, August 2005.
190. "Plasmonics: Optics at the Nanoscale", The 2005 Landsdowne Lecturer in Chemistry and Electrical Engineering, University of Victoria, CA, September, 2005 (technical lecture).
191. "Nanoshells: using Nanotechnology to harvest light for biomedicine", The 2005 Landsdowne Lecturer in Chemistry and Electrical Engineering, University of Victoria, CA, September, 2005 (popular lecture).
192. "Introduction to Nanophotonics", CNST Lecture Series, Rice University, September 2005.
193. "Plasmonics: Optics at the Nanoscale", Invited Seminar, University of Bath, UK (postponed due to Hurricane Rita until 2006)
194. Invited Seminar, Cancer Workshop, Oxford, UK. (postponed due to Hurricane Rita until 2006)
195. "Plasmonics: Nanoengineering Substrates for Surface Enhanced Spectroscopies", Invited Seminar, Department of Chemistry, University of Glasgow, Scotland, UK (postponed due to Hurricane Rita until 2006)
196. "Plasmonics: Fundamental excitations in mesoscale geometries and designing substrates for surface enhanced spectroscopies", University of California, Davis, October 2005.
197. Plenary talk, NIST Colorado Nanoscience Conference, October 2005. (declined)

198. Invited speaker: Civic Forum on the Societal Implications of Nanotechnology, Austin, TX, October 2005.
199. Invited seminar: Stanford University, November 2005.
200. "Plasmonics: Optics at the Nanoscale", NSF sponsored US-Egypt Workshop on Nanostructured Materials and Nanotechnology, Alexandria, Egypt, November 2005.
201. "Plasmonic Nanostructures for Surface Enhanced Raman Scattering: Comparing geometries and field enhancement" MRS meeting, Boston, MA, November 2005.
202. "Plasmonics: Optical Nanostructures by Rational Design", ECE Seminar, University of Texas at Austin, January 2006.
203. "Nanoshells: from plasmon physics to cancer therapy", Distinguished Speaker Series, Center for Nano and Molecular Science and Technology, University of Texas, February 2005.
204. "Nanoshells: from Plasmon physics to cancer therapy", Invited speaker series, Department of Chemistry, University of Utah, February 13, 2006.
205. "A Plasmonic platform for nanoscale chemical sensing", Gordon Research Conference on Bioanalytical Sensors, Monterey, CA, March 2006.
206. "Designing Nanotools for Biomedicine", 28<sup>th</sup> Annual Symposium of the Burnham Institute, La Jolla, CA, April 2006.
207. "Designing Optical Nanotools for Biomedicine", The Dorothy J. Killam Lecture, Montreal Neurological Society, McGill University, May 2006.
208. Invited speaker, ECE Department, University of Wisconsin, Madison, WI, April 2006 (declined).
209. "Nanoshells: from plasmon physics to cancer therapy" and "Nanoengineered Plasmonic substrates for surface enhanced spectroscopies", Colloquium and Tutorial, Kavli Nanoscience Institute Distinguished Speaker Series, Caltech, May 2006.
210. "Beyond Drugs, Cancer, and Fear: The promise of nanotechnology in biomedicine", Perspectives on the Future of Science and Technology Conference, U. S. Department of State sponsorship, Lake Como, IT, May 2006.
211. "Taking the (Nano) device approach: applications of nanotechnology in the diagnosis and treatment of cancer and other diseases," Gordon Research Conference in Molecular Therapeutics of Cancer, Oxford, UK, July 2006.
212. "Plasmonic Nanostructures: artificial molecules enabling nanoscale spectroscopies and nanophotonics-based biomedical applications," Gordon Research Conference in Plasmonics – Optics at the Nanoscale, Keene, NH, July 2006.
213. "Plasmonic Nanostructures: artificial molecules enabling nanoscale spectroscopies and nanoparticle-based biomedical applications", Invited talk, European Union Research Training Network HYTEC, Annual Meeting, Heraklion, Crete, July 2006.
214. "Tunable plasmonic nanostructures for improving near-field optics, sensing, diagnostics," SPIE (Society for Photo-optical Instrumentation Engineers) Annual Meeting, San Diego, CA, August 2006.
215. "Plasmonic Nanostructures: Artificial Molecules," Plenary Talk, SPIE (Society for Photo-optical Instrumentation Engineers) Annual Meeting, San Diego, CA, August 2006.
216. "An all-optical SERS-based pH nanosensor," SPIE (Society for Photo-optical Instrumentation Engineers) Annual Meeting, San Diego, CA, August 2006.
217. "The Plasmonics approach: engineered nanostructures for rationally optimized surface enhanced spectroscopy substrates", Colloquium, Edgewood Chem and Bio Center, Aberdeen Proving Ground, Aberdeen, MD, August 2006.
218. "Plasmonic Nanostructures: artificial molecules enabling nanoscale spectroscopies and nanoparticle-based biomedical applications", Nano 2006 Conference, San Sebastian, Spain, September 2006.
219. "Plasmonic Nanoparticles: Molecular Orbitals writ large", Chemistry Department Colloquium, Case Western Reserve University, Cleveland, OH, September 2006.
220. "Plasmonic Nanostructures: molecular orbitals writ large" and "Nanoengineered Plasmonic substrates for surface enhanced spectroscopies", Annual Nanowire Symposium, Division of Solid State Physics and the Nanometer Consortium, Lund University, Sweden, October 2006.
221. "When plasmons interact, worlds collide", Kirkpatrick Lecture, Illinois Institute of Technology, Chicago, IL, September 2006.
222. "Plasmon Hybridization: molecular orbitals writ large", Physical Chemistry Seminar, U. C. Berkeley, October 2006.
223. "A Nanoscale all-optical pH meter", IEEE-LEOS Annual Meeting, Montreal, Canada, November 2006.
224. "Plasmonics", Ecole Polytechnique de Montreal, Montreal, CA, November 2006.
225. "Taming surface enhanced spectroscopies with tailored plasmonic nanoparticle substrates", Chemistry Research Seminar, University of California, Santa Barbara October 2006.

226. ECE Departmental Seminar, Georgia Tech, Atlanta GA, November 2006.
227. Invited talk, MRS Annual Meeting, November 2006.
228. Invited talk, University of Pittsburgh, December 2006.
229. "Plasmonics: Optics at the Nanoscale", Invited talk, Argonne National Laboratory, December 2006.
230. Invited talk, Physics of Quantum Electronics Conference, Snowbird, UT, January 2007.
231. "Nanophotonics: the next Big Thing", Invited talk, CINT Annual Workshop, Los Alamos National Laboratory/Sandia National Laboratory.
232. Annual Invited Lecturer, Institute for Materials Research, University of Connecticut, February 2007.
233. Keynote Speaker, Peachey Conference, Purdue, University, Lafayette, IN, February 2007.
234. Invited talk, University of Utah, February 2007.
235. Plenary Speaker, IOP Annual Meeting in Nanoscale Physics and Technology, Southampton, UK, March 2007.
236. Invited talk, "Nanotechnology for Defense Applications", San Diego, April 2007.
237. Invited talk, Spring MRS meeting, San Francisco, CA, April 2007.
238. WINS Lecturer, University of Western Ontario, May 2007.
239. Invited Speaker, Special Symposium, 75<sup>th</sup> Anniversary of Applied Physics Society of Japan, Tokyo, Japan August 2007.
240. Invited talk, Scandinavian Network of Women Physicists, Lyngby, Denmark, August 2007.
241. Invited talk, SPIE Annual Meeting, San Diego, CA, August 2007.
242. Invited talk, SPIE Annual Meeting, San Diego, CA, August 2007.
243. Invited talk, 35<sup>th</sup> International Conference on Spectroscopy, Xiamen, China, September 2007.

#### Conference Presentations:

1. N. J. Halas, D. Krokul, and D. Grischkowsky, "An Ultrafast Light Controlled Optical Fiber Modulator", pre Conference for Lasers and Electro-Optics (CLEO), Baltimore, MD, April 1987.
2. N. J. Halas, D. Krokul, G. Giuliani, and D. Grischkowsky, "Dark Pulse Propagation in Optical Fibers", OSA Annual Meeting, Rochester, NY, October 1987.
3. N. J. Halas and J. Bokor, "Time-Resolved Study of Surface Recombination at  $S_i$  (III)  $2 \times 1$ ", Adriatica Meeting on Laser-Surface Interactions, Trieste, Italy, August 1988.
4. N. J. Halas and R. A. Cheville, "Time-Resolved Reflectivity Studies of the  $Z_nS_e/G_aA_s$  Interface", International Laser Science Conference: ILS-7, Monterrey, CA, September 1991.
5. N. J. Halas and R. A. Cheville, "Relaxation Dynamics of Solid  $C_{60}$ ", International Laser Science Conference: ILS-7, Monterrey, CA, September 1991.
6. N. J. Halas and R. A. Cheville, "Time-Resolved Reflectivity Studies of the  $Z_nS_e/G_aA_s$  Interface", OSA Annual Meeting, San Jose, CA, November 1991.
7. N. J. Halas and R. A. Cheville, "Time-Resolved Excited-State Relaxation Processes in Solid  $C_{60}$ ", OSA Annual Meeting, San Jose, CA, November 1991.
8. N. J. Halas and R. A. Cheville, "A Wide Bandwidth, High Conversion Efficiency Frequency Doubler", OSA Annual Meeting, San Jose, CA, November 1991.
9. N. J. Halas and R. A. Cheville, "Time-Resolved Carrier Relaxation in the Solid Fullerenes", March Meeting of the American Physical Society, Indianapolis, IN, March 1992.
10. N. J. Halas and R. A. Cheville, "Carrier Dynamics in the Solid Fullerenes", Conference on Lasers and Electro-Optics, Anaheim, CA, May 1992.
11. N. J. Halas and R. A. Cheville, "Time-Resolved Carrier Dynamics in Solid  $C_{60}$ ", International Quantum Electronics Conference, Vienna, Austria, June 1992.
12. N. J. Halas, and R. A. Cheville, "Carrier Dynamics in  $C_{60}$  Thin Films", OSA Conference, Albuquerque, NM, September 1992.
13. N. J. Halas, M. T. Reiten, and R. A. Cheville, "Dispersive Frequency Doubling of a  $T_i$ : Sapphire Laser with High Conversion Efficiency", OSA Conference, Albuquerque, NM, September 1992.
14. N. J. Halas and D. Sarkar, "Diffusion of Silver into Solid  $C_{60}$  Films", March Meeting of the American Physical Society, Seattle, WA, March 1993.
15. N. J. Halas, H. Philips, D. Sarkar, and R. Sauerbrey, "Excimer Laser Induced Electrical Conductivity in  $C_{60}$  Thin Films", March Meeting of the American Physical Society, Seattle, WA, March 1993.
16. N. J. Halas, R. A. Cheville, and R. D. Averitt, "High-Accuracy Measurement of the Slow Relaxation in  $C_{60}$  Thin Films", March Meeting of the American Physical Society, Seattle, WA, March 1993.

17. N. J. Halas and R. A. Cheville, "Ultrafast Large Dynamic Range Absorption Spectroscopy of Solid C<sub>60</sub>", Optical Society of America Conference, Toronto, Canada, October 1993.
18. R. D. Averitt, J. M. Alford and N. J. Halas, "Solvent-free Separation and Purification of Fullerenes", the Materials Research Society Annual Meeting, Boston, MA, November 1993.
19. Jay Samuel Resh, Dip Sarkar and N. J. Halas, "Scanning Tunneling Microscopy and Spectroscopy using Fullerene-Coated Tips", Materials Research Society Annual Meeting, Boston, MA, November 1993.
20. N. J. Halas, V. Papanyan, P. Pippenger, R. D. Averitt, and R. A. Cheville, "Solvent Free High Purity C<sub>60</sub>: Optical Properties", the Second International Conference on Optical Probes of Conjugated Polymers and Fullerenes, Salt Lake City, UT, February 1994.
21. J. A. Dura, P. M. Pippenger, J. S. Resh, N. J. Halas, X. Z. Xiong, P. C. Chow, and S. C. Moss, "Epitaxial Growth and Characterization of Single Crystal C<sub>60</sub>", *Bulletin of the American Physical Society* **39**, 151 (1994).
22. J. S. Resh, A. Ignatiev, D. Sarkar, and N. J. Halas, "Scanning Tunneling Microscopy and Tunneling Spectroscopy with Fullerene Coated Tips", *Bulletin of the American Physical Society* **39**, 152 (1994).
23. R. D. Averitt, M. J. Alford, J. Steele and N. J. Halas, "Vapor Phase Separation and Purification of C<sub>60</sub>," *Bulletin of the American Physical Society* **39**, 681 (1994).
24. N.J. Halas, R. A. Cheville, P. Pippenger, and R. D. Averitt, "Relaxation Dynamics in Solid C<sub>60</sub>: The role of Guest Species", *Bulletin of the American Physical Society* **39**, 757 (1994).
25. D. Sarkar and N. J. Halas, "The Dember Effect in Solid C<sub>60</sub>", *Bulletin of the American Physical Society* **39**, 757 (1994).
26. M. T. Reiten, R. A. Cheville, and N. J. Halas, "Focussing and Phase-Matching Effects in Noncollinear Sum Frequency Mixing of near VUV Ultrashort Pulses", Conference on Lasers and Electro-Optics, (CLEO-94), Anaheim, CA, May 1994.
27. R. D. Averitt, P. M. Pippenger, J. A. Dura, V. O. Papanyan, P. J. Nordlander, and N. J. Halas, "Photoluminescence in Solid C<sub>60</sub>", Materials Research Society Fall Meeting, Boston, MA, November 1994.
28. R. D. Averitt, P. M. Pippenger, J. A. Dura, V. O. Papanyan, P. J. Nordlander, and N. J. Halas, "Photoluminescence in Epitaxial Single Crystal C<sub>60</sub>", American Physical Society Meeting, Division of Condensed Matter Physics, postdeadline poster, San Jose, CA, March 1995.
29. K. F. Kelly, S. Prato, D. Sarkar, J. Resh, and N. J. Halas, "Imaging Fullerene Nanotips", American Physical Society Meeting, Division of Condensed Matter Physics, postdeadline poster, San Jose, CA, March 1995.
30. R. A. Cheville, R. D. Averitt, and N. J. Halas, "Ultrafast Large Dynamic Range Spectroscopy", CLEO/QELS meeting, Baltimore, MD, May 1995.
31. R. D. Averitt, N. J. Halas, P. M. Pippenger, P. J. Nordlander, V. O. Papanyan and J. A. Dura, "Photoluminescence Spectra of Epitaxial Single Crystal C<sub>60</sub>", *Bulletin of the American Physical Society* **41**, 93 (1996).
32. D. Sarkar and N. J. Halas, "Electromagnetic Response of a Tip-Substrate Geometry", March meeting of the American Physical Society," *Bulletin of the American Physical Society* **41**, 63 (1996).
33. K. F. Kelly, D. Sarkar, G. D. Hale, S. J. Oldenburg, and N. J. Halas, "Preparation, Characterization and Imaging Applications of Fullerene STM Tips", *Bulletin of the American Physical Society* **41**, 115 (1996).
34. R. D. Averitt, Dipankar Sarkar, and N. J. Halas, "Production and Characterization of Gold-Terminated Gold Sulfide Nanoparticles", Texas Section of the American Physical Society Meeting, Arlington, TX, October 1996.
35. Gregory D. Hale and N. J. Halas, "Triplet State Studies of MEH-PPV using Two-Photon Photoemission", Texas Section of the American Physical Society Meeting, Arlington, TX, October 1996.
36. R. D. Averitt, Dipankar Sarkar, and N. J. Halas, "Optical Properties of Gold/Gold Sulfide Nanoshells," American Physical Society March Meeting, Kansas City, MO, March 1997.
37. S. J. Oldenburg, R. D. Averitt and N. J. Halas, "Self-assembled Metal Nanoshells", American Physical Society March Meeting, Kansas City, MO, March 1997.
38. K. F. Kelly and N. J. Halas , "Theory of Electron Scattering at Point Defects on Graphite Surfaces", American Physical Society March Meeting, Kansas City, MO, March 1997.
39. G. D. Hale, S. J. Oldenburg, and N. J. Halas, "Triplet Exciton Dynamics in MEH-PPV Films as Investigated using Two-photon Photoemission", American Physical Society March Meeting, Kansas City, MO, March 1997.
40. K. F. Kelly and N. J. Halas, "Imaging of Point Defects on Graphite Surfaces using C<sub>60</sub>-Adsorbed STM tips", STM 97, Hamburg, Germany, July 1997.
41. G. D. Hale and N. J. Halas , "Studies of Triplet Excitons in MEH-PPV using Two-Photon Photoemission", SPIE conference on the properties of conducting polymers, San Diego, CA, July 1997.
42. Steven J. Oldenburg, Richard D. Averitt, Sarah L. Westcott, and N. J. Halas, "Higher Order Plasmon Resonances of Gold Nanoshells", American Physical Society Meeting, Los Angeles, CA, March 1998.

43. S. L. Westcott, S. J. Oldenburg, T. R. Lee, and N. J. Halas , “Optical Properties of Controlled Nanoscale Assemblies of Metal Nanoparticles”, American Physical Society Meeting, Los Angeles, CA, March 1998.
44. Kevin F. Kelly and N. J. Halas, “Characterization of Local Defect Sites on Graphite Surfaces,” American Physical Society Meeting, Los Angeles, CA, March 1998.
45. G. D. Hale and N. J. Halas , “Two-photon Photoemission Spectroscopy of Poly(3-octylthiophene)”, American Physical Society Meeting, Los Angeles, CA, March 1998.
46. K. F. Kelly, N. J. Halas, Y.-S. Shon, and T. R. Lee, “Functionalized Fullerene SAMs studied with STM”, American Physical Society Meeting, Atlanta, Georgia, March 1999.
47. N. J. Halas, S. L. Westcott, and R. D. Averitt , “Interface-Dependent Electron Dynamics in Gold Nanoshells”, American Physical Society Meeting, Atlanta, Georgia, March 1999.
48. S. Oldenburg, G. D. Hale, J. Jackson, and N. J. Halas, “Multipole Resonant Light Scattering Properties of Gold Nanoshells”, Conference on Lasers and Electro-Optics (CLEO) Baltimore, MD, May 1999.
49. S. L. Westcott, R. D. Averitt, and N. J. Halas, “Optical Properties and Ultrafast Electron Dynamics in Gold Nanoshells”, Quantum Electronics and Laser Science (QELS) Baltimore, MD, May 1999.
50. K. F. Kelly, I. Chiang, G. Scuseria, R. Hauge, J. Margrave, X. Wang, C. Radloff, and N. J. Halas, “Sidewall Functionalization of Single Wall Nanotubes”, American Chemical Society (ACS) Meeting, New Orleans, LA, August 1999.
51. S. Oldenburg, S. L. Westcott, R. D. Averitt, and N. J. Halas, “Surface Enhanced Raman Scattering on Metal Nanoshell Substrates”, ILS/OSA Meeting, Santa Clara, CA, September 1999.
52. S. L. Westcott, J. Wolfgang, P. Nordlander, and N. J. Halas, “Hot Electron Thermalization in Metal Nanoshells”, ILS/OSA Meeting, Santa Clara, CA, September 1999.
53. K. F. Kelly, I. Chang, G. Scuseria, R. Hauge, J. Margrave, X. Wang, C. Radloff, and N. J. Halas, “Sidewall Fluorination and Alkylation of Single Wall Nanotubes: an STM study”, American Vacuum Society (AVS) Meeting, Seattle, WA, October 1999.
54. L. Hirsch, N. J. Halas, and J. West, “Antibody-Conjugated Nanoshells for Optical Antigen Detection”, Nanospace 2000 Conference, Houston, TX, January 2000.
55. L. Hirsch, N. J. Halas, and J. West, “Metal Nanoshells as a Novel Substrate for Biosensing Applications”, 18<sup>th</sup> Annual Houston Society for Engineering in Medicine and Biology (HSEMB) Conference, February 2000.
56. L. Hirsch, N. J. Halas, and J. West, “Metal Nanoshells in Biosensing Applications”, Sixth Biomaterials World Congress, Kamuela, Hawaii, May 15-20, 2000.
57. L. Hirsch, N. J. Halas, and J. West, “Near-Infrared Thermally-Induce Cell Death using Metal Nanoshells”, 2000 Biomedical Engineering Society Annual Meeting , Seattle, WA, October 12-14, 2000.
58. L. Hirsch, N. J. Halas, and J. West, “Metal Nanoshells as a Novel Substrate for Biosensing Applications”, 2000 Biomedical Engineering Society Annual Meeting , Seattle, WA, October 12-14, 2000.
59. S. R. Sershen, S. L. Westcott, N. J. Halas, & J. L. West, “Temperature-Sensitive Polymer-Nanoshell Composites for Photothermally Modulated Drug Delivery,” Nanospace 2000, January 2000.
60. S. R. Sershen, S. L. Westcott, N. J. Halas, & J. L. West, “Temperature-Sensitive Polymer-Nanoshell Composites for Photothermally Modulated Drug Delivery,” Houston Society for Engineering in Medicine and Biology, February 2000.
61. S. R. Sershen, S. L. Westcott, N. J. Halas, & J. L. West, “Temperature-Sensitive Polymer-Nanoshell Composites for Photothermally Modulated Drug Delivery,” World Biomaterials Congress 2000, May 2000.
62. S. R. Sershen, S. L. Westcott, N. J. Halas, & J. L. West, “Temperature-Sensitive Polymer-Nanoshell Composites for Photothermally Modulated Drug Delivery,” 27<sup>th</sup> International Symposium on Controlled Release of Bioactive Materials, July 2000 (2000 CRS-Cygnus Graduate Student Award for Outstanding Work in Drug Delivery from the 27<sup>th</sup> International Symposium on Controlled Release of Bioactive Materials)
63. S. R. Sershen, S. L. Westcott, N. J. Halas, & J. L. West, “Temperature Sensitive Polymer-Nanoshell Composites for Photothermally Modulated Drug Delivery,” Annual Biomedical Engineering Society Fall Meeting, October 2000.
64. C. Moran, G. D. Hale, and N. J. Halas, “Synthesis and Optical Properties of Rare Earth Doped Silica Nano- and Microparticles”, Materials Research Society Meeting, Boston, MA, November 2000.
65. N. J. Halas, “Resonant Light Scattering Properties of Metal Nanoshells”, Materials Research Society Meeting, Boston, MA, November 2000.
66. S. Sershen, S. L. Westcott, N. J. Halas, and J.L. West, “Polymer-Nanoshell Composites for Photothermally Modulated Drug Delivery”, Materials Research Society Meeting, Boston, MA, November 2000.
67. S. Lal, R. N. Taylor, S. L. Westcott, C. Radloff, J. B. Jackson, and N. J. Halas, “Coupling between Nanoparticle plasmons and a guided wave structure”, American Physical Society Meeting, Seattle, WA, March 2001.

68. S. Westcott, J. B. Jackson, J. Wolfgang, P. Nordlander, and N. J. Halas, "Adsorbate-Induced Quenching of hot electrons in core-shell nanoparticles", American Physical Society Meeting, Seattle, WA, March 2001.
69. J. B. Jackson, S. L. Westcott, L. Hirsch, and N. J. Halas, "Manipulating the local electromagnetic field at the surface of a core-shell nanoparticle", American Physical Society Meeting, Seattle, WA, March 2001.
70. S. Lal, R. N. Taylor, S. L. Westcott, C. Radloff, J. B. Jackson, and N. J. Halas, "Plasmon-plasmon Interaction between Gold Nanoshells and Gold Surfaces", Conference in Lasers and Electro-Optics, Baltimore, MD, May 2001.
71. L. R. Hirsch, J. L. West, J. B. Jackson, C. E. Moran, and N. J. Halas, "Metal Nanoshells: a Novel Substrate for Immunoassays", Conference in Lasers and Electro-Optics, Baltimore, MD, May 2001.
72. C. Moran, C. Radloff, and N. J. Halas, "Mask Free Soft Lithographic Fabrication of Submicron 2D Metallized Arrays", Materials Research Society Meeting, San Francisco, CA, April 2002.
73. C. Radloff, "Fabrication and Optical Properties of Multilayer Metal Nanoshells", Materials Research Society Meeting, San Francisco, CA, April 2002
74. C. Charnay, "Nanocups: Reduced Symmetry Metal Nanoshells", Materials Research Society Meeting, San Francisco, CA, April 2002.
75. S. Sershen, R. Drezek, N. Halas, and J. West, "Optically Active Nanoshells as Enhancing Agents for Laser Tissue Welding", Biomaterials, April 2002.
76. J. Jackson, "Probing the Optical Near Field of a Nanolens" CLEO Conference, Long Beach, CA, May 2002
77. C. Moran, J. Steele, A. Lee, C. Aguirre, C. Radloff, and N. J. Halas, "Soft Lithographic directed growth of wire grating arrays with optical resonances", SPIE Annual Meeting, Seattle, WA, July 2002..
78. C. Moran, J. M. Steele, A. Lee, C. Aguirre, C. Radloff, A. Rimberg, and N. J. Halas, "Fabrication and Optical Properties of Submicron 2D Metallized Arrays", SPIE Annual Meeting, Seattle, WA, July 2002.
79. C. Radloff and N. J. Halas, "The decomposition of gold nanoshells in carbon tetrachloride", SPIE Annual Meeting, Seattle, WA, July 2002.
80. J. Jackson and N. J. Halas, "Probing the Optical Near Field of a Nanolens", SPIE Annual Meeting, Seattle, WA, July 2002.
81. R. Drezek, N. Halas, and J. West, "Nanotechnology for Molecular Imaging and Therapy", Third NIH Conference on Optical Imaging, Washington, DC, September 2002.
82. A. Lin, J. West, N. Halas, and R. Drezek, "Nanoparticle-based Contrast Agents for Biophotonics", Nanodays, Houston, TX, October 2002.
83. R. Drezek, N. J. Halas, and J. West, "Nanomaterials as Smart Agents in Optical Imaging", NSF Workshop on Nanomaterials, Boston, MA, December 2002.
84. J.M. Steele, C.E. Moran, A. Lee, C. Aguirre and N.J. Halas, "Optical Properties of Metallodielectric Gratings with Subwavelength Slots", American Physical Society March Meeting, Austin, TX, 2003.
85. J. B. Jackson, L. R. Hirsch, J. L. West and N. J. Halas, "Controlling the Surface Enhanced Raman Effect on Nanoshells in a Film Geometry", American Physical Society, March Meeting, Austin, TX, March 2003.
86. C.E. Moran, J.M. Steele, C. Radloff, and C. Aguirre, "Mask-free passive stamp lithography: Fabrication and optical properties of large-area periodic submicron metal structures", Oral Presentation, American Chemical Society Annual Meeting, New Orleans, LA, March 2003.
87. J. B. Jackson, L. R. Hirsch, J. L. West and N. J. Halas, "Controlling the Surface Enhanced Raman Effect on Nanoshells in a Film Geometry", American Chemical Society, March Meeting, New Orleans, LA, March 2003.
88. J.M. Steele, C.E. Moran, A. Lee, N.J. Halas, "Plasmonic Properties of Metallodielectric Gratings", SPIE Annual Meeting, San Diego, CA, August 2003.
89. A. Lin, N. Halas, J. West, and R. Drezek, "Nanoengineered Contrast Agents for Biophotonics", Advances in Optical Technologies for Lasers, Medicine and Surgery, Banff, Canada, August 2003.
90. C. Loo, N. Halas, J. West, and R. Drezek, "Molecular Specific Imaging using Scattering Nanoshells", Advances in Optical Technologies for Lasers, Medicine and Surgery, Banff, Canada, August 2003.
91. A. Lin, J. West, N. Halas, and R. Drezek, "Nanoengineered Contrast Agents for Biophotonics", Nanodays, Houston, TX, October 2003.
92. C. Loo, L. Hirsch, N. Halas, J. West, and R. Drezek, "Biomedical Applications of Metal Nanoshells", SPIE: Biophotonics West, San Jose, CA, January 2004.
93. J. Barton, J. West, N. Halas, and R. Drezek, "Nanoshells for Optical Coherence Tomography", SPIE: Biophotonics West, San Jose, CA, January 2004.
94. A. Lin, J. West, N. Halas, and R. Drezek, "Monte Carlo Investigation of Optical Signal Changes in Tissue after Nanoshell Application", Houston Society for Engineering in Medicine and Biology 21<sup>st</sup> Annual Meeting, Houston, TX, February 2004.

95. M. H. Lee, J. West, N. Halas, and R. Drezek, "Nanoshells as Contrast Agents for Optical Coherence Tomography", Houston Society for Engineering in Medicine and Biology 21<sup>st</sup> Annual Meeting, Houston, TX, February 2004.
96. C. Loo, J. West, N. Halas, and R. Drezek, "Nanoshell-enabled Molecular Imaging, Houston Society for Engineering in Medicine and Biology 21<sup>st</sup> Annual Meeting, Houston, TX, February 2004.
97. K. Fu, N. Halas, and R. Drezek, "Automated Goniometer for Polarized Light Scattering Measurements for Nanoparticles", Houston Society for Engineering in Medicine and Biology 21<sup>st</sup> Annual Meeting, Houston, TX, February 2004.
98. J. Jackson, "Surface Enhanced Raman Spectroscopy on Tunable Plasmonic Substrates", American Physical Society Meeting, Montreal, CA, March 2004 (invited talk by graduate student Joseph Jackson).
99. J. Jackson and N. J. Halas, "Controlled Optical Pumping in Stokes and anti-Stokes Resonant Nanoshell Films", American Physical Society Meeting, Montreal, CA, March 2004.
100. Surbhi Lal, Glenn P. Goodrich, Bruce E. Brinson, N. J. Halas "Plasmon-induced modifications in spontaneous emission of fluorophores in controlled nanoscale geometries", American Physical Society Meeting, Montreal, CA, March 2004.
101. Jennifer Steele, P. J. Nordlander, G. Goodrich, and N. J. Halas, "Properties of Nanoshell Image Plasmons", American Physical Society Meeting, Montreal, CA, March 2004.
102. Felicia Tam, Cristin Moran, and N. J. Halas, "Investigating Parameters Controlling Nanoshell SPR sensitivity", American Physical Society Meeting, Montreal, CA, March 2004.
103. C. Loo, L. Hirsch, N. Halas, J. West, and R. Drezek, "Cancer Imaging using Gold Nanoshells", OSA Biomedical Topical Meeting 2004, April 2004.
104. Amanda Lowery, P. O'Neal, C. Loo, L. R. Hirsch, J. Stafford, J. Hazle, L. R. Hirsch, N. J. Halas, R. Drezek, and J. L. West, "Photothermal Tumor Therapy with Metallic Nanoshells", World Biomaterials Congress, Sydney, Australia, May 2004.
105. Andre M. Gobin, Patrick O'Neal, N. J. Halas, R. Drezek, and J. L. West, "Nanoshells as Near Infrared Absorbers to Enhance Laser Tissue Welding", World Biomaterials Congress, Sydney, Australia, May 2004.
106. Christopher Loo, Amanda Lowery, Jennifer West, N. J. Halas, and R. Drezek, "Molecular Imaging of Breast Cancer using Gold Nanoshells", World Biomaterials Congress, Sydney, Australia, May 2004.
107. R. Drezek, N. Halas, and J. L. West, "Nanotechnology in Breast Cancer Imaging", Fifth Annual CAMD Workshop: Nanotechnology in Bioscience, Biotechnology, and Medicine, New Orleans, LA, June 2004.
108. R. Drezek, N. Halas, and J. West, "Towards Nanotechnology-Enabled Breast Cancer Imaging", NanoSummit 2004, Houston, TX, July 2004.
109. H. Wang, G. P. Goodrich, C. Oubre, P. Nordlander, and N. J. Halas, "Tailoring of the optical properties and surface topography of gold nanoshells by chemical etching", 18th Rice Quantum Institute Summer Research Colloquium, Houston, Texas, 6 August 2004.
110. Nathaniel K. Grady, Naomi J. Halas, Peter Nordlander, "Influence of Dielectric Function Properties on the Optical Response of Plasmon Resonant Metallic Nanoparticles," American Physical Society March Meeting, Los Angeles, CA, March 2005.
111. Nathaniel K. Grady, Surbhi Lal, Glenn P. Goodrich, Naomi J. Halas, "Profiling the Nanoshell Near Field With SERS," American Physical Society March Meeting, Los Angeles, CA, March 2005.
112. Nathaniel K. Grady, Naomi J. Halas, "Plasmon Hybridization: Mesoscopic Quantum Analogs of Atomic and Molecular Systems," Gordon Research Conference on Atomic Physics, Tilton, NH, June 2005.
113. H. Wang and N. J. Halas, "Nanoscale surface texturing of Au nanoshells", Oral Presentation, 230th American Chemical Society (ACS) National Meeting, Washington DC, August 2005.
114. H. Wang, F. Tam, N. K. Grady, and N. J. Halas, "Cu nanoshells: effects of interband transitions on the nanoparticle plasmon resonance", Oral Presentation, 19th Rice Quantum Institute Summer Research Colloquium, Houston, Texas, August 2005.
115. H. Wang and N. J. Halas, "Close-packed nanoparticle arrays as surface enhanced Raman spectroscopy (SERS) substrates", 2005 Materials Research Society (MRS) Fall Meeting, Boston, MA, 30 November 2005.
116. N. J. Halas, C. Oubre, P. Nordlander, H. Wang, J. Jackson, N. Grady, F. Tam, T. Huser, C. Talley, C. Hollards, S. Lane, C. Levin, and M. Gheith, "Plasmonic nanostructures for SERS sensing: comparing geometries and local field properties", 2005 Materials Research Society (MRS) Fall Meeting, Boston, MA, 1 December 2005.
117. A.T. Chang, C.L. Nehl, F. Tam, N.J. Halas, J.H. Hafner, K.F. Kelly, "Plasmon-based Enhanced NSOM Spectroscopy", American Physical Society March Meeting, Baltimore, MD, March 2006.
118. F. Tam, G.P. Goodrich, B.R. Johnson, and N.J. Halas, "Effect of Plasmon Energy on Molecular Fluorophore Emission", Plasmonics Gordon Research Conference, Keene, NH, July 2006.

- 119.F. Tam, G.P. Goodrich, N.J. Halas, "Effect of Plasmon Energy on Molecular Fluorophore Emission", Plasmonics Gordon Research Conference, Keene, NH, July 2006.
- 120.H. Wang, Y. Wu, D. W. Brandl, B. Lassiter, F. Le, P. Nordlander, and N. J. Halas, "Plasmonic metallodielectric nanostructures with reduced symmetry", Optics and Photonics 2006-SPIE Conference, San Diego, CA, 16 August 2006.
- 121.F. Tam, G.P. Goodrich, N.J. Halas, "Effect of Vicinal Tunable Plasmonic Nanostructures on the Fluorescence Emission of Indocyanine Green", SPIE Optics and Photonics, San Diego, CA, August 2006.