Louis Eugene Brus

Non-Technical Publications.

Louis Brus**, "William Oliver Baker (1915-2005): A Biographical Memoir".** US National Academy of Sciences 2013.

Bruce Berne, Louis Brus, George Flynn, Joshua Jortner, "**Richard Bersohn (1925-2003): A Biographical Memoir".** US National Academy of Sciences 2013.

Research and Review Publications about 270 total. Hirsch index 104 on Google Scholar.

1) L. E. Brus, ``Lifetime Studies of Na(3^2P) and Tl(7^2S) Produced by Photodissociation and Quenched by Halogens,'' J. Chem. Phys. *52*, 1716 (1970).
2) L. E. Brus and J. Comas, ``Chemisorptive Luminescence: Oxygen on Si(111) Surfaces,'' J. Chem. Phys. *54*, 2771 (1971).
3) M. C. Lin and L. E. Brus, ``Chemical CO Laser from the O(^{1}D) + C_3O_2($^1\sum_g^+ \rightarrow$ 3CO($^1\sum^+$) Reaction,'' J. Chem. Phys. *54*, 5423 (1971).
4) L. E. Brus and M. C. Lin, ``Chemical HF Lasers from Flash Photolysis of Various N_2F_4 + RH Systems,'' J. Phys. Chem. *75*, 2546 (1971).
5) L. E. Brus, ``Two Exponential Decay of 3371 Å Laser Excited CS_2 Fluorescence,'' Chem. Phys. Letters *12*, 116 (1971).
6) L. E. Brus and M. C. Lin, ``Chemical Lasers Produced from O(^{1}D) Atom Reactions. V. Carbon Monoxide Stimulated Emission from Flash-Initiated O_3 + XCN Systems,'' J. Phys. Chem. *76*, 1429 (1972).
7) L. E. Brus, ``Transition Dipole Moments in Extreme Renner Effect Molecules, with Application to the Visible $A_1 \rightarrow B_1$ Bands in CH_2, NH_2, and BH_2,'' J. Chem. Phys. *57*, 3167 (1972).
8) J. R. McDonald and L. E. Brus, ``Laser Excited Time-Resolved Fluorescence of the Cl_2 CS Molecule,'' Chem. Phys. Letters *16*, 587 (1972).
9) L. E. Brus and J. R. McDonald, ``Electronic Structure and Dynamics of Tunable Laser Excited p-Benzoquinone (- h_4 and - d_4) in the Gas Phase,'' J. Chem. Phys. *58*, 4223 (1973).
10) L. E. Brus and J. R. McDonald, ``Collision Free, Time Resolved Fluorescence of SO_2 Excited Near 2900 Å,'' Chem. Phys. Letters *21*, 283 (1973).
11) J. R. McDonald and L. E. Brus, ``Time Resolved Emission from Intermediate Strong Coupling States in Quinoxaline Vapor,'' Chem. Phys. Letters *23*, 87 (1973).
12) J. R. McDonald and L. E. Brus, ``Excited State Electronic Structure and Dynamics in sym-TetrazineVapor,'' J. Chem. Phys. *59*, 4966 (1973).
13) L. E. Brus and J. R. McDonald, ``Time-Resolved Fluorescence Kinetics and $^1B_1$ ($^1\Delta_g$) Vibronic Structure in Tunable Laser Excited SO_2 Vapor,'' J. Chem. Phys. *61*, 97 (1974).
14) S. H. Dworetsky, L. E. Brus, and R. S. Hozack, ``Large Molecule Rotational Structure via Single-Mode Laser Resonance Fluorescence,'' J. Chem. Phys. *61*, 1581 (1974).
15) J. R. McDonald and L. E. Brus, ``Radiative and Radiationless Transition Phenomena in 1,4-, 1,3-, and 1,2-Diazanaphthalene Vapors,'' J. Chem. Phys. *61*, 3895 (1974).
16) V. E. Bondybey and L. E. Brus, ``Rigid Cage Effect on ICl Photodissociation and B O^+ Fluorescence in Rare Gas Matrices,'' J. Chem. Phys. *62*, 620 (1975).
17) L. E. Brus and V. E. Bondybey, ``Pseudorotational Local Mode Participation in OH and OD ($A^2\sum^+$) Vibrational Relaxation in a Ne Lattice,'' J. Chem. Phys. *63*, 786 (1975).

18) V. E. Bondybey and L. E. Brus, ``Interdependence of Guest Radiationless Transitions and Localized Phonon Structure: NH and ND ($A^3\pi$) in Rare Gas Lattices,'' J. Chem. Phys. *63*, 794 (1975).
19) L. E. Brus and V. E. Bondybey, ``Molecular Ions and Electron Transport in Rare Gas Lattices: C_2^- Formation Mechanism and $X^2\Sigma_g^+ \leftrightarrow B^2\Sigma_u^+$ Spectroscopy,'' J. Chem. Phys. *63*, 3123 (1975).
20) V. E. Bondybey and L. E. Brus, ``Photophysics of C_2^- ($B^2\Sigma_u^+$) in Rare Gas Lattices: Vibrational Relaxation through Intermediate $^4\Sigma_u^+$ Levels,'' J. Chem. Phys. *63*, 2223 (1975).
21) L. E. Brus and V. E. Bondybey, ``Rigid Cage Conversion of a Perfluoroalkl Iodide Repulsive Electronic State into a ``Bound'' Electronic State,'' Chem. Phys. Letters *36*, 252 (1975).
22) V. E. Bondybey and L. E. Brus, ``Rigid Cage Photodissociation Dynamics: A Double Minimum Problem for ICl in Ne and Ar Lattices,'' J. Chem. Phys. *64*, 3724 (1976).
23) L. E. Brus and V. E. Bondybey, ``Cage Effects and Steric Hinderance in van der Waals Solids, with Application to Alkyl Iodide Photolysis in Rare Gas Hosts,'' J. Chem. Phys. *65*, 71 (1976).
24) J. Goodman and L. E. Brus, ``Long Range Vibrational Energy Transfer from ND and NH ($A^3\pi$) to CO and N_2 in Solid Ar,'' J. Chem. Phys. *65*, 1156 (1976).
25) J. Goodman and L. E. Brus, ``Mechanism of Vibrational Relaxation in Molecular Solids,'' J. Chem. Phys. *65*, 3146 (1976).
26) Julie Goodman and L. E. Brus, ``Ground $X^2\Sigma^+$ State Potential Well, and Excited State Dynamics of Diatomic XeF in Solid Ne and Ar,'' J. Chem. Phys. *65*, 3808 (1976).
27) L. E. Brus, ``Electronic Transition Dipole Moments and Excited-State Alignment in Linear Molecules, with Application to Diatomic Rare Gas Halides,'' J. Mol. Spec. *64*, 376 (1977).
28) Julie Goodman, J. C. Tully, V. E. Bondybey, and L. E. Brus, ``Excited State Spectroscopy, Subpicosecond Predissociation, and Solvation of Diatomic XeO in Solid Rare Gas Hosts,'' J. Chem. Phys. *66*, 4802 (1977).
29) Julie Goodman and L. E. Brus, ``Rydberg States in Condensed Phases: Evidence for Small ``Bubble'' Formation around NO 3sσ ($A^2\Sigma^+$) in Solid Rare Gases,'' J. Chem. Phys. *67*, 933 (1977).
30) Julie Goodman and L. E. Brus, ``Electronic Spectroscopy and Dynamics of the Low-Lying $A^3\Sigma_u^+$, $C^3\Delta_u$, and $c^1\Sigma_u$ state of O_2 in van der Waals Solids,'' J. Chem. Phys. *67*, 1482 (1977).
31) Julie Goodman and L. E. Brus, ``Structure and Energy Transfer within Isolated $(O_2)_2$ Dimers via High Resolution Electronic Spectroscopy,'' J. Chem. Phys. *67*, 4398 (1977).
32) Julie Goodman and L. E. Brus, ``Local Mode Involvement in the Vibrational Relaxation of Isolated $(O_2)_2$ Dimers,'' J. Chem. Phys. *67*, 4408 (1977).
33) Julie Goodman and L. E. Brus, ``Hydrogen Bonding and Charge Transfer: Interaction of OH Radical with Rare Gas Atoms,'' J. Chem. Phys. *67*, 4858 (1977).
34) Julie Goodman and L. E. Brus, ``Solvent Effect on Excited State Conformation Changes in CF_3NO,'' J. Am. Chem. Soc. *100*, 2971 (1978).
35) Julie Goodman and L. E. Brus, ``Formaldehyde-d_2 Photophysics in Condensed Phase,'' Chem. Phys. Letters *58*, 399 (1978).
36) Julie Goodman and L. E. Brus, ``Distant Intramolecular Interaction between Identical Chromophores: The n-π* excited state of p-Benzoquinone,'' J. Chem. Phys. *69*, 1604 (1978).

37) J. Goodman and L. E. Brus, ``Proton Transfer and Tautomerism in an Excited State of Methyl Salicylate,'' J. Am. Chem. Soc. *100*, 7472 (1978).
38) J. Goodman and L. E. Brus, ``Vibrational Relaxation and Small ``Bubble'' Spectroscopy of the NO 3sσ ($A^2\sum^+$) Rydberg State in Solid Rare Gases,'' J. Chem. Phys. *69*, 4083 (1978).
39) J. Goodman and L. E. Brus, ``Weak Isotope Effect in the Condensed Phase Vibrational Relaxation of a Nonhydride Molecule: NO (a^4II),'' J. Chem. Phys. *69*, 1853 (1978).
40) L. E. Brus, ``Acetylene Fluorescence,'' J. Mol. Spec. *75*, 245 (1979).
41) A. Baca, R. Rossetti, and L. E. Brus, ``Structure and Dynamics of the Biphenyl Ring Torsion in Solid Neon and Argon,'' J. Chem. Phys. *70*, 5575 (1979).
42) R. Rossetti and L. E. Brus, ``Ground and n-π* Excited State Structures of the Hydrogen Bonded Complexes Pyrazine-H_2O and Pyrazine-$(H_2O)_2$,'' J. Chem. Phys. *70*, 4730 (1979).
43) R. Rossetti and L. E. Brus, ``The Mechanism of Vibrational Relaxation in Solids: Multiphonon Relaxation of $O_2(c^1\sum_u^-)$ in Ar, Kr, and Mixed Ar-Kr Matrices,'' J. Chem. Phys. *71*, 3963 (1979).
44) P. F. Barbara, L. E. Brus, and P. M. Rentzepis, ``A Picosecond Time-Resolved Fluorescence Study of sym-Tetrazine Vibrational Relaxation in Solution,'' Chem. Phys. Letters *69*, 447 (1980).
45) R. Rossetti and L. E. Brus, ``Waveguide Propagation in Frozen Gas Matrices,'' Rev. Sci. Instrum. *51*, 467 (1980)
46) L. E. Brus and V. E. Bondybey, ``Spectroscopic and Time Resolved Studies of Small Molecule Relaxation in Condensed Phase,'' review article in **Radiationless Transitions** (Academic Press, N.Y., 1980), S. H. Lin, editor, pp. 259-286.
47) V. E. Bondybey and L. E. Brus, ``Nonradiative Processes in Small Molecules in Low-Temperature Solids,'' chapter in **Advances in Chemical Physics Vol. 41** (Wiley, N.Y., 1980), I. Prigogine and S. A. Rice, editors, pp. 269-320.
48) P. F. Barbara, P. M. Rentzepis, and L. E. Brus, ``Photochemical Kinetics of Salicylidenaniline,'' J. Am. Chem. Soc. *102*, 2786 (1980).
49) R. Rossetti and L. E. Brus, ``Time Resolved Molecular Electronic Energy Transfer into a Silver Surface,'' J. Chem. Phys. *73*, 572 (1980).
50) L. E. Brus, ``Application of Classical Electromagnetic Theory to an Understanding of Molecular Vibrational Energy Transfer into Metal Surfaces,'' J. Chem. Phys. *73*, 940 (1980).
51) P. F. Barbara, L. E. Brus, and P. M. Rentzepis, ``Intramolecular Proton Transfer and Excited-State Relaxation in 2-(2-Hydroxyphenyl)Benzothiazole,'' J. Am. Chem. Soc. *102*, 5631 (1980).
52) R. Rossetti, R. C. Haddon, and L. E. Brus, ``Intramolecular Proton Tunnelling in the Ground and Lowest Excited Singlet States of 9-Hydroxyphenalenone,'' J. Am. Chem. Soc. *102*, 6913 (1980).
53) R. Rossetti and L. E. Brus, ``Proton Tunnelling Dynamics and an Isotopically Dependent Equilibrium Geometry in the Lowest Excited π–π* Singlet State of Tropolone,'' J. Chem. Phys. *73*, 1546 (1980).
54) P. F. Barbara, P. M. Rentzepis and L. E. Brus, ``Direct Picosecond Observation of Unrelaxed Fluorescence from Tetracene in Condensed Media,'' J. Chem. Phys. *72*, 6802 (1980).
55) L. E. Brus, ``Long Range Vibrational Energy Transfer to Dielectric Surfaces,'' J. Chem. Phys. *74*, 737 (1981).
56) L. E. Brus, ``Optical Propagation and Vibrational Energy Loss in Gaseous Waveguide Lasers,'' IEEE J. Quan. Elec. *QE-17*, 293 (1981).

57) R. Rossetti, R. Rayford, R. C. Haddon, and L. E. Brus, ``Proton Localization in an Asymmetric Double Minimum Potential: 2-Methyl-9-Hydroxyphenalenone,'' J. Am. Chem. Soc. *103*, 4303 (1981).

58) Abraham Nitzan and L. E. Brus, ``Can Photochemistry be Enhanced on Rough Surfaces?'' J. Chem. Phys. *74*, 5321 (1981).

59) S. M. Beck and L. E. Brus, ``Transient Raman Observation of Quinoxaline Aqueous Protonation Kinetics,'' J. Am. Chem. Soc. *103*, 2495 (1981).

60) Abraham Nitzan and L. E. Brus, ``Theoretical Model for Enhanced Photochemistry on Rough Surfaces,'' J. Chem. Phys. *75*, 2205 (1981).

61) S. M. Beck and L. E. Brus, ``Enhanced Sensitivity of Transient Spontaneous Raman Scattering in Micellar Solutions,'' J. Chem. Phys. *75*, 1031 (1981).

62) S. M. Beck, and L. E. Brus, ``Transient Spontaneous Raman Observation of the Reaction Dynamics of Triplet Quinoxaline in Aqueous Solutions,'' J. Chem. Phys. *75*, 4934 (1981).

63) S. M. Beck and L. E. Brus, ``Transient Intermediates in the Photo-Fries Isomerization of Phenyl Acetate via Spontaneous Raman Spectroscopy,'' J. Am. Chem. Soc. *104*, 1805 (1982).

64) R. Rossetti and L. E. Brus, ``Time Resolved Energy Transfer from Electronically Excited $^3B_{3u}$ Pyrazine Molecules to Planar Ag and Au Surfaces,'' J. Chem. Phys. *76*, 1146 (1982).

65) S. M. Beck and L. E. Brus, ``Photooxidation of Water by p-Benzoquinone,'' J. Am. Chem. Soc. *104*, 1103 (1982).

66) S. M. Beck and L. E. Brus, ``Transient Raman Scattering Study of the Initial Semiquinone Radical Kinetics following Photolysis of Aqueous Benzoquinone and Hydroquinone,'' J. Am. Chem. Soc. *104*, 4789 (1982).

67) S. M. Beck and L. E. Brus, ``The Resonance Raman Spectra of Aqueous Phenoxy and Phenoxy-d_5 Radicals,'' J. Chem. Phys. *76*, 4700 (1982).

68) S. M. Beck and L. E. Brus, ``Transient Spontaneous Raman Study of Photoinization Kinetics at the Hydrocarbon: Water Interface in Micellar Solution,'' J. Am. Chem. Soc. *105*, 1106 (1983).

69) R. Rossetti and L. Brus, ``Electron-Hole Recombination Emission as a Probe of Surface Chemistry in Aqueous CdS Colloids,'' J. Phys. Chem. *86*, 4470 (1982).

70) R. Rossetti, S. M. Beck and L. E. Brus, ``Transient Raman Scattering Observation of Surface Reactions in Aqueous TiO_2 Colloids,'' J. Am. Chem. Soc. *104*, 7322 (1982).

71) R. Rossetti, S. M. Beck, and L. E. Brus, ``Resonance Raman Investigation of the π^* Antibonding Distribution in Excited Triplet Aqueous ρ-Benzoquinone,'' J. Phys. Chem. *87*, 3058 (1983).

72) S. M. Beck and L. E. Brus, ``Transient Raman Scattering Studies of Chemical Kinetics in Aqueous Micellar and Semiconductor Colloidal Solutions,'' **Time-Resolved Vibrational Spectroscopy** (Academic, N.Y., 1983), G. Atkinson, ed., pp. 391-398.

73) R. Rossetti, S. Nakahara, and L. E. Brus, ``Quantum Size Effects in the Redox Potentials, Resonance Raman Spectra, and Electronic Spectra of CdS Crystallites in Aqueous Solutions,'' J. Chem. Phys. *79*, 1086 (1983).

74) L. E. Brus, ``A Simple Model for the Ionization Potential, Electron Affinity, and Aqueous Redox Potentials of Small Semiconductor Crystallites,'' J. Chem. Phys. *79*, 5566 (1983).

75) R. Rossetti, S. M. Beck, and L. E. Brus, ``Direct Observation of Charge Transfer Reactions Across Semiconductor: Aqueous Solution Interfaces Using Transient Raman Spectroscopy,'' J. Am. Chem. Soc. *106*, 980 (1984).

76) L. E. Brus, ``Electron-electron and Electron-Hole Interactions in Small Semiconductor Crystallites: The Size Dependence of the Lowest Excited Electronic State,'' J. Chem. Phys. *80*, 4403 (1984).
77) R. Rossetti, J. L. Ellison, J. M. Gibson, L. E. Brus, ``Size Effects in the Excited Electronic States of Small Colloidal CdS Crystallies,'' J. Chem. Phys. *80*, 4464 (1984).
78) L. E. Brus, ``Quantum Size Effects in the Electronic Properties of Small Semiconductor Crystallites,'' **Proceedings of the 17th Jerusalem Symposium on Quantum Chemistry: Molecule-Surface Interactions (**Riedel, Amsterdam, 1984).
79) L. E. Brus, ``On the Development of Bulk Optical Properties in Small Semiconducting Crystallites,'' J. of Luminescence 31 and 32, 381 (1984).
80) R. Rossetti and L. E. Brus, ``Time-Resolved Raman Scattering Observation of Charge Transfer into a Semiconductor by an Adsorbed, Electronically Excited Molecule,'' J. Am. Chem. Soc. *106*, 4336 (1984).
81) R. Rossetti, R. Hull, J. M. Gibson, L. E. Brus, ``Excited Electronic States and Optical Spectra of ZnS and CdS Crystallites in the ~15Å to 50Å Range: Evolution from Molecular to Bulk Semiconducting Properties,'' J. Chem. Phys. *82*, 552 (1985).
82) A. R. Leheny, R. Rossetti, and L. E. Brus, ``Molecular Resonance Raman Observation of Tetrathiafulvalene Oxidation by Colloidal Platinum Crystallites,'' J. Phys. Chem. *89*, 221 (1985).
83) R. Rossetti, R. Hull, J. M. Gibson and L. E. Brus, ``Hybrid Electronic Properties between the Molecular and Solid State Limits: Lead Sulfide and Silver-Halide Crystallites,'' J. Chem. Phys. *83*, 1406 (1985).
84) A. R. Leheny, R. Rossetti, and L. E. Brus, ``Tetrathiafulvalene Photoionization in Micellar Solutions: A Time-Resolved Raman Scattering Study of Interfacial Solvation,'' J. Phys. Chem. *89*, 4091 (1985).
85) R. Rossetti and L. E. Brus, ``Picosecond Resonance Raman Scattering Study of Methyl Viologen Reduction on the Surface of PhotoExcited Colloidal CdS Crystallites,'' J. Phys. Chem. *90*, 558 (1986).
86) Louis Brus, ``Electronic Spectroscopy of Semiconductor Clusters,'' NATO Advanced Study Institute, Ser. C 174, 111 (1986).
87) Louis Brus, ``Zero Dimensional `Excitons' in Semiconductor Clusters,'' review article in IEEE J. of Quan. Elec. *QE-22*, 1909 (1986).
88) N. Chestnoy, T. D. Harris, R. Hull, and L. E. Brus, ``Luminescence and Photophysics of CdS Semiconductor Clusters: The Nature of the Emitting Electronic State,'' J. Phys. Chem. *90*, 3393 (1986).
89) R. Rossetti and L. E. Brus, ``Picosecond Time Resolved Raman Scattering Study of H Atom Abstraction by Electronically Excited Triplet Benzoquinone,'' J. Am. Chem. Soc. *108*, 4718 (1986).
90) R. C. Haddon, L. E. Brus, and K. Raghavachari, ``Electronic Structure and Bonding in Icosahedral C_{60},'' Chem. Phys. Letters *125*, 459 (1986).
91) L. E. Brus, ``Electronic Wavefunctions in Semiconductor Clusters,'' *Feature Article*, J. Phys. Chem. *90*, 2555 (1986).
92) N. Chestnoy, R. Hull, and L. E. Brus, ``Higher Excited Electronic States in Clusters of ZnSe, CdSe, and ZnS: Spin-orbit, Vibronic, and Relaxation Phenomena,'' J. Chem. Phys. *85*, 2237 (1986).
93) R. C. Haddon, L. E. Brus, and K. Raghavachari, ``Rehybridization and π-Orbital Alignment: The Key to the Existence of Spheroidal Carbon Clusters,'' Chem. Phys. Letters *131*, 165 (1986).
94) L. E. Brus, ``Size Dependent Development of Band Structure in Semiconductor Crystallites,'' Nouveau Journal de Chimie *11*, 124 (1987).

95) P. J. Carroll and L. E. Brus, ``Saturation and Nonlinear Field Effects in the Picosecond Resonance Raman Spectra of β-Carotene,'' J. Chem. Phys. *86*, 6584 (1987).
96) P. J. Carroll and L. E. Brus, ``Picosecond Raman Scattering Study of Electron Localization in the Charge Transfer Excited State of tris(bipyridine)ruthenium II,'' J. Am. Chem. Soc. *109*, 7613 (1987).
97) Louis Brus, ``Electron Transfer Reactions Studied via Time-Resolved Resonance Raman Spectroscopy,'' chapter in **Photoinduced Electron Transfer** (Elsevier, 1988) D. Chanon and M. A. Fox, eds.
98) Louis Brus, ``Time-Resolved Resonance Raman Spectroscopy: Intense Electromagnetic Field Effects, and Photoelectrochemical Reactions on Semiconductor Crystallite Surfaces,'' chapter in **Advances in Multiphoton Processes and Spectroscopy Vol. IV** (World Scientific Publishing, 1987), S. H. Lin, ed.
99) M. L. Steigerwald, A. P. Alivisatos, J. M. Gibson, T. D. Harris, R. Kortan, A. J. Muller, A. M. Thayer, T. M. Duncan, D. C. Douglass, and L. E. Brus, ``Surface Derivatization and Isolation of Semiconductor Cluster Molecules,'' J. Am. Chem. Soc. *110*, 3046 (1988).
100) Guy Makov, A. Nitzan, and L. E. Brus, ``On the Ionization Potential of Small Metal and Dielectric Particles,'' J. Chem. Phys. *88*, 5076 (1988).
101) A. P. Alivisatos, A. L. Harris, N. J. Levinos, M. L. Steigerwald and L. E. Brus, ``Electronic States of Semiconductor Clusters: Homogeneous and Inhomogeneous Broadening of the Optical Spectrum,'' J. Chem. Phys. *89*, 4001 (1988).
102) A. P. Alivisatos, T. D. Harris, P. J. Carroll, M. L. Steigerwald and L. E. Brus, ``Electron-Vibration Coupling in Semiconductor Clusters Studied by Resonance Raman Spectroscopy,'' J. Chem. Phys. *90*, 3463 (1989).
103) A. P. Alivisatos, T. D. Harris, L. E. Brus and A. Jayaraman, ``Resonance Raman Scattering and Optical Absorption Studies of CdSe Microclusters at High Pressure,'' J. Chem. Phys. *89*, 5979 (1988).
104) P. F. Barbara, P. K. Walsh and Louis E. Brus, ``Picosecond Kinetic and Vibrationally Resolved Spectroscopic Studies of Intramolecular Excited Hydrogen Atom Transfer,'' *Feature Article*, J. Phys. Chem. *93*, 29 (1989).
105) M. L. Steigerwald and L. E. Brus, ``Synthesis and Surface Reactions of Semiconductor Crystallite Clusters in Reverse Micelle Media,'' **Structure and Reactivity in Reverse Micelles** (Elsevier Science, Amsterdam, 1989), M. Pileni, ed., pp. 189-198.
106) R. Siegel and L. Brus (Co-chairmen of DOE Study Panel), ``Research Opportunities on Clusters and Cluster-Assembled Materials,'' J. Mater. Res. *4*, 704 (1989).
107) M. L. Steigerwald and L. E. Brus, ``Synthesis, Stabilization, and Electronic Structure of Quantum Semiconductor Nanoclusters,'' Ann. Rev. Mater. Sci. *19*, 471 (1989).
108) C. T. Dameron, R. N. Reese, R. K. Mehra, A. R. Kortan, P. J. Carroll, M. L. Steigerwald, L. E. Brus and D. R. Winge, ``Biosynthesis of Cadmium Sulphide Quantum Semiconductor Crystallites,'' Nature *338*, 596 (1989).
109) J. G. Brennan, T. Siegrist, P. J. Carroll, S. M. Stuczynski, L. E. Brus and M. L. Steigerwald, ``The Preparation of Large Semiconductor Clusters via the Pyrolysis of a Molecular Precursor,'' J. Am. Chem. Soc. *111*, 4141 (1989).
110) Louis Brus, ``Valency in Clusters with Strong Chemical Bonding,''chapter in **Proceedings of the Welsh Conference on Chemical Research XXXII Valency** (1988), W. O. Baker, ed.
111) M. Bawendi, M. L. Steigerwald, and L. E. Brus, ``The Quantum Mechanics of Larger Semiconductor Clusters (``Quantum Dots''),'' Ann. Rev. Phys. Chem. *41*, 477 (1990).
112) M. L. Steigerwald and L. E. Brus, ``Semiconductor Crystallites: A Class of Large Molecules,'' Accts. Chem. Res. 23, 183 (1990).

113) Louis Brus, ``Structure, Surface Chemistry, and Electronic Properties of Quantum Semiconductor Crystallites,'' J. Soc. Photo. Sci. Technol. Japan, 53, 329 (1990).
114) A. R. Kortan, R. Hull, R. L. Opila, M. G. Bawendi, M. L. Steigerwald, P. J. Carroll and L. E. Brus, ``Nucleation and Growth of CdSe on ZnS Quantum Crystallite Seeds, and Vice Versa, in Inverse Micelle Media,'' J. Am. Chem. Soc. *112*, 1327 (1990).
115) M. G. Bawendi, A. R. Kortan, M. L. Steigerwald, and L. E. Brus, ``X-ray Structural Characterization of Larger CdSe Semiconductor Clusters,'' J. Chem. Phys. *91*, 7282 (1989).
116) J. G. Brennan, T. Siegrist, P. J. Carroll, S. M. Stuczynski, P. Reynders, L. E. Brus and M. L. Steigerwald, ``Bulk and Nanostructure II-VI Compounds from Molecular Organometallic Precursors,'' Chemistry of Materials *2*, 403 (1990).
117) M. G. Bawendi, W. L. Wilson, L. Rothberg, P. J. Carroll, T. M. Jedju, M. L. Steigerwald and L. E. Brus, ``Electronic Structure and Photoexcited Carrier Dynamics in Nanometer-Size CdSe Clusters,'' Phys. Rev. Lett. *65*, 1623 (1991).
118) M. Marcus, W. Flood, M. Steigerwald, L. Brus, and M. Bawendi, ``Structure of Capped CdSe Clusters by EXAFS,'' J. Phys. Chem. *95*, 1572 (1991).L. E. Brus, ``Structure and Electronic States of Quantum Semiconductor Crystallites,'' Nanostructured Materials 1, 75 (1992).
119) W. L. Wilson, M. G. Bawendi, L. Rothberg, P. J. Carroll, T. Jedju, L. Brus, and M. L. Steigerwald, ``Absorption Saturation Dynamics in Capped CdSe Microcrystallites Exhibiting Quantum Confinement,'' **Springer Series in Chemical Physics Vol. 53 Ultrafast Phenomena VII (**Springer-Verlag, Berlin, 1990), p. 259.
120) L. Brus, ``Quantum Crystallites and Nonlinear Optics,'' Applied Physics *A53*, 2283 (1991).
121) Louis Brus, ``Squeezing Light from Silicon,'' news and views article in Nature 353, 301 (1991).
122) M. G. Bawendi, P. J. Carroll, William L. Wilson, and L. E. Brus, ``Luminescence Properties of CdSe Quantum Crystallites: Resonance Between Interior and Surface Localized States,'' J. Chem. Phys. *96*, 946 (1992).
123) M. A. Marcus, L. E. Brus, C. Murray, M. G. Bawendi, A. Prasad, A. P. Alivisatos, ``EXAFS Studies of Cd Chalcogenide Nanocrystals,'' Nanostructured Materials *1*, 323 (1992).
124) K. A. Littau, P. J. Szajowski, A. J. Muller, A. R. Kortan, and L. E. Brus, ``Luminescent Silicon Nanocrystal Colloid via a High Temperature Aerosol Reaction,'' J. Phys. Chem. *97*, 1224 (1993).
125) W. L. Wilson, P. F. Szajowski and L. E. Brus, ``Quantum Confinement in Size-Selected, Surface-Oxidized Silicon Nanocrystals,'' Science *262*, 1242 (1993).
126) L. E. Brus, ``Luminescence of Direct and Indirect Gap Quantum Semiconductor Crystallites,'' Proc. MRS Symposium on ``Clusters and Colloids'' Vol. 272, (MRS, Pittsburgh, 1992) P. Persans, ed.
127) L. E. Brus, ``Radiationless Transitions in CdSe Quantum Crystallites,'' Israel J. of Chem. *33*, 9 (1993).
128) Louis Brus, commentary article ``Capped Nanometer Silicon Electronic Materials,'' Advanced Materials 5, 286 (1993).
129) L. E. Brus, ``Electronic & Optical Properties of Semiconductor Nanocrystals: From Molecules to Bulk Crystals,'' NATO ASI Ser.E, *260*, 433 (1994).
130) Louis Brus and Don Eigler, ``Devices and Desires,'' news and views article in Nature *369*, 273 (1994)
131) Louis Brus, ``The Luminescence of Silicon Materials: Chains, Sheets, Nanocrystals, Nanowires, Microcrystals, and Porous Silicon,'' *Feature Article*, J. Phys. Chem. *98*, 3575 (1994).

132) L. Brus, ``Larger Semiconductor Clusters (Quantum Dots),'' **Springer Series in Chemical Physics Vol. 56 Clusters of Atoms and Molecules II** (Springer-Verlag, Berlin, 1994), H. Haberland, ed., p. 312.

133) S. Schuppler, S. L. Friedman, M. A. Marcus, D. L. Alder, Y.-H. Xie, F. M. Ross, T. D. Harris, W. L. Brown, Y. L. Chabal, L. E. Brus, and P. H. Citrin, ``Dimensions of Luminescent Oxidized and Porous Silicon Structures,'' Phys. Rev. Lett. *72*, 2648 (1994).

134) J. K. Trautman, J. J. Macklin, L. E. Brus, and E. Betzig, ``Near-Field Spectroscopy of Single Molecules at Room Temperature,'' Nature *369*, 40 (1994).

135) L. Brus, ``Luminescence of Silicon Nanocrystals and Porous Silicon,'' Jpn. J. Appl. Phys. *34*, Suppl. 34-1, p. 5 (1994).

136) L. E. Brus, ``Luminescence of Silicon Materials,'' **Semiconductor Silicon/1994** (The Electrochemical Society, 1994, H. Huff, ed.), p. 470.

137) L. E. Brus and J. K. Trautman, ``Nanocrystals and Nano-Optics,'' Phil. Trans. R. Soc. Lond., Ser. A *353*, 313 (1995).

138) L. E. Brus, P. F. Szajowski, W. L. Wilson, T. D. Harris, S. Schuppler, and L. E. Brus, ``Electronic Spectroscopy and Photophysics of Si Nanocrystals: Relationship to Bulk c-Si and Porous Si,'' J. Am. Chem. Soc. *117*, 2915 (1995).

139) S.Schuppler, S.L.Friedman, M.A. Marcus, D.L.Adler, Y.H.Xie, F.M.Ross, T.D.Harris, W.L.Brown, Y.J.Chabal, P.J.Szajowski, E.E.Chaban, L.E.Brus, and P.H.Citrin, "Size, Shape, and Crystallinity of Luminescent Structures in Oxidized Si Nanoclusters and H-Passivated Porous Si",Mat. Res. Soc. Symp. Proc., *358*, 407 (1995).

140) S. Schuppler *et. al*., ``Size, Shape, and Composition of Luminescent Species in Oxidized Si Nanocrystals and H-passivated porous Si,'' Phys. Rev. *B52*, 4910 (1995).

141) J. J. Macklin, J. K. Trautman, T. D. Harris, and L. E. Brus, ``Imaging and Time-Resolved Spectroscopy of Single Molecules at an Interface,'' Science *272*, 255 (1996).

142) Louis Brus, ``Model for Carrier Dynamics and Photoluminescence Quenching in Wet and Dry Porous Silicon Thin Films,'' Phys. Rev. *B53*, 4649 (1996).

143) L. E. Brus, J. A. W. Harkless, and F. H. Stillinger, ``Theoretical Metastability of Semiconductor Crystallites in High Pressure Phases, with Application to Beta-Tin Structure Silicon,'' J. Am. Chem. Soc. *118*, 4834 (1996)

144) S. H. Tolbert, A. B. Herhold, L. E. Brus, and A. P. Alivisatos, ``Pressure Induced Structural Transformations in Si Nanocrystals: Surface and Shape Effects,'' Phys. Rev. Lett. *76*, 4384 (1996).

145) N. Nirmal, B. O. Dabbousi, M. G. Bawendi, J. J. Macklin, J. K. Trautman, T.D. Harris, and L. E. Brus, "Fluorescence Intermittency in Single Cadmium Selenide Nanocrystals," Nature *383*, 802 (1996).

146) D. J. Norris, M. G. Bawendi, and L. E. Brus, ``Optical Properties of Semiconductor Nanocrystals (Quantum Dots),'' chapter 9 in **Molecular Electronics** (M. Ratner and J. Jortner, eds., Blackwell Science, Ltd., 1997).

147) M. Nirmal and L. Brus, review article "Semiconductor Nanocrystals: Exciton Quantum Mechanics, Single Nanocrystal Luminescence, and Metastable High Pressure Phases.", MRS Symposium Proceedings Vol. Xxx, "Microcrystalline and Nanocrystalline Semiconductors" (MRS, Pittsburgh, Pa., 1997).

148) Louis Brus, perspective article "Metastable Dense Semiconductor Phases", Science *276*, 373 (1997).

149) Louis Brus, "Semiconductor Nanocrystals as Molecules and Building Blocks", Modular Chemistry, NATO ASI Ser.C, Vol *499* (J. Michl, ed., Kluwer Academic, Dordrecht, 1997), p. 303

150) Louis Brus, "Chemical Approaches to Semiconductor Nanocrystals", J. Phys. Chem. Solids *59*, 459 (1998).

151) L. Brus, ``Silicon Polymers and Nanocrystals,'' a chapter in **Light Emission in Silicon: From Physics to Devices, Volume 49 in the series Semiconductors and Semimetals** (Academic Press, 1998, D. J. Lockwood, editor), pp. 303-327.
152) M. Nirmal and L. Brus, "Luminescence Photophysics in Semiconductor Nanocrystals", Accounts of Chemical Research *32,* 407 (1999)
153) L. Brus, "Nano-materials: Electrons in mesoporous semiconductor/liquid thin films", Curr. Opin. Coll. Inter. Sci. *4*, 308 (1999)
154) E. Rabani, B. Hetenyi, B. Berne, and L. Brus, "Electronic Properties of CdSe Nanocrystals in the Absence and Presence of a Dielectric Medium, J. Chem. Phys. *110*, 5355 (1999)
155) L. Brus, ``Chemical Approaches to Semiconductor Nanocrystals, and Nanocrystal Materials,'' chapter in the AIP monograph Nanotechnology (G. Timp, ed., Springer-Verlag, 1999.)
156) J. M. Fox, T. J. Katz, S. Van Elshocht, T. Verbiest, M. Kauranen, A. Persoons, T. Krauss and L. Brus, "Synthesis, Self-Association, and Nonlinear Optical Properties of Conjugated helical Metal Phthalocyanines", J. Am. Chem. Soc. *121,* 3453 (1999).
157) Amy M. Michaels, M. Nirmal, and L. E. Brus, "Surface Enhanced Raman Spectroscopy of Individual Rhodamine 6G Molecules on Large Ag Nanocrystals", J. Am. Chem. Soc. *121*, 9932 (1999).
158) T. D. Krauss and L. E. Brus, "Charge, Polarizability, and Photoionization of Individual Semiconductor Nanocrystals", Phys. Rev. Lett. *83*, 4840 (1999).
159) B. S. Kim, L. Avila, L. E. Brus, and I. P. Herman, "Organic Ligand and Solvent Kinetics during the Assembly of CdSe nanocrystal arrays using Infrared Attenuated Total Reflection", App. Phys. Lett. *76*, 3715 (2000).
160) G. Ge and L. E. Brus, "Evidence for Spinodal Phase Separation in Two-Dimensional Nanocrystal Self-Assembly", J. Phys. Chem. *B104*, 9574 (2000).
161) Jiang Jiang, Todd D. Krauss, and Louis E. Brus, "Electrostatic Force Microscopy Characterization of Trioctylphosphine Oxide Self-Assembled Monolayers on Graphite", J. Phys. Chem. *B104*, 11936 (2000).
162) Amy Michaels, Jiang Jiang, and Louis Brus, "Ag Nanocrystal Junctions as the Site for Surface Enhanced Raman Scattering of Single Rhodamine 6G Molecules", J. Phys. Chem. *B104*, 11965 (2000).
163) Zhonghua Yu and Louis Brus, "Reversible Oxidation Effect in Raman scattering from Metallic Single-Wall Carbon Nanotubes" J. Phys. Chem. *A104*, 10995 (2000).
164) T. D. Krauss and L. E. Brus, "Electronic Properties of Single Semiconductor Nanocrystals: Optical and Electrostatic Force Microscopy Measurements," Materials Science and Engineering *B69-70*, 2289 (2000).
165) Stanilaus S. Wong and Louis E. Brus, "Narrow Mie Optical Cavity Resonances From Individual 100nm Hematite Crystallites", J. Phys. Chem. *B105*, 599 (2001)
166) Zhonghua Yu and Louis Brus, "Rayleigh and Raman Scattering from Individual Carbon Nanotube Bundles" J. Phys. Chem. *B105*, 1123 (2001).
167) Todd D. Krauss, Stephen O'Brien, and L. E. Brus, "Charge and Photoionization Properties of Single Semiconductor Nanocrystals" J. Phys. Chem. *B105*, 1725 (2001)
168) Zhonghua Yu and Louis Brus, "(n,m) Structural Assignments and Chirality Dependence in Single-Wall Carbon Nanotube Raman Scattering", J. Phys. Chem. *B105*, 6831 (2001)
169) Guanglu Ge and Louis E. Brus, "Fast Surface Diffusion of Large Disk Nanocrystal Aggregates", Nano Letters *1*, 219 (2001).
170) Bosang Kim, Mohammad Islam, Louis Brus, and Irving Herman, "Interdot Interactions and band gap changes in CdSe Nanocrystal Arrays at Elevated Pressure", J. Appl. Phys. *89*, 8127 (2001).

171) Bernard F. Erlanger, Bi-Xing Chen, Min Zhu, and Louis Brus "Binding of an Anti-fullerene IgG Monoclonal Antibody to Single Wall Carbon Nanotubes" Nano Letters *1*, 465 (2001).
172) S. O'Brien, L. Brus, and C. B. Murray, "Synthesis of Monodisperse Particles of Barium Titanate: Towards a Generalized Strategy of Oxide Nano-Particle Synthesis", J. Am. Chem. Soc. *123*, 12085 (2001).
173) Jing Tang, Guanglu Ge, and Louis Brus, "Gas-Liquid-Solid Phase Transition Model for Two Dimensional Nanocrystal Self-Assembly on Graphite", J. Phys. Chem. *B106*, 5653 (2002).
174) Ken Bosnick, Jiang Jiang, and Louis Brus "Fluctuations and Local Symmetry in Single-Molecule Rhodamine 6G Raman Scattering in Silver Nanocrystal Aggregates", J. Phys. Chem. *B106*, 8096 (2002).
175) R. Cava etal, "Future Directions in Solid State Chemistry", Progress in Solid State Chemistry *30*, 101 (2002).
176) L. Balogh, C. X. Zhang, S. O'Brien, N. J. Turro, and L. Brus, "Surface Modification of CdSe Nanocrystals with Organic Ligands," Chimica Oggi/Chemistry Today, 2002, *20(6)*, 45-51
177) O. Cherniavskaya, L. Chen, V. Weng, L. Yuditsky, L. . Brus, "Quantitative Non-contact Electrostatic Force Imaging of Nanocrystal Polarizability", J. Phys. Chem. *B107*, 1525 (2003).
178) J. Tang, M. Meyers, K. A. Bosnick, L. Brus, "Magnetite Fe_3O_4 Nanocrystals: Spectroscopic observation of Aqueous Oxidation Kinetics", J. Phys. Chem. *B107*, 7501 (2003)
179) Thuc-Quyen Nguyen, M. Bushey, L. Brus, C. Nuckolls, "Tuning Intermolecular Attraction to Create Polar Order and One-Dimensional Nanostructures on Surfaces", J. Am. Chem. Soc. *124*, 15051 (2002)
180) Z. Zhou, L. Brus, R. Friesner, "Electronic Structure and Luminescence of 1.1 and 1.4 nm Silicon Nanocrystals: Oxide Shell versus Hydrogen Passivation", Nano Letters *3*, 167 (2003).
181) O. Cherniavskaya, L. Chen, M. Islam, L. Brus "Photoionization of Individual CdSe/CdS Core/Shell Nanocrystals on Silicon with 2nm Oxide Depends upon Surface Band Bending", Nano Letters *3*, 497 (2003).
182) Cui, Xiaodong; Freitag, Marcus; Martel, Richard; Brus, Louis; Avouris, Phaedon. "Controlling Energy-Level Alignments at Carbon Nanotube/Au Contacts", Nano Letters *3*, 783-787. (2003).
183) Z. Zhou, R. Friesner, L. Brus, "Electronic Structure of 1 to 2 nm Diameter Silicon Core/Shell Nanocrystals: Surface Chemistry, Optical Spectra, Charge Transfer, and Doping", J. Am. Chem. Soc. *125*, 15599-15607 (2003).
184) E. Rabani, D.R. Reichman, P.L. Geissler, and L.E. Brus, "Drying-Mediated Self Assembly of Particles", Nature *426*, 271-274 (2003).
185) D. Adams etal, "Charge Transfer on the Nanoscale: Current Status", J. Phys. Chem. *B107*, 6668 (2003).
186) J. Jiang, K. Bosnick, M. Maillard, and L. Brus, "Single Molecule Raman Spectroscopy at the Junctions of Large Ag Nanocrystals", J. Phys. Chem. *B107*, 9964 (2003) Feature Article
187) M. Maillard, P. Huang, L. Brus, "Silver Nanodisk Growth by Surface Plasmon Enhanced Photoreduction of Adsorbed [Ag^+]", Nano Letters *3*, 1611-1615 (2003)
188) O. Cherniavskaya, L. Chen, L. Brus "Imaging of Photoionization of CdSe/CdS Core-Shell Nanocrystals on N and P-type Silicon Substrates with Thin Oxides", J. Phys. Chem. *B108*, 4946 (2004)

189) C. Ben-Porat, O. Cherniavskaya, L. Brus "Electric Fields on Oxidized Silicon Surfaces: Static Polarization of PbSe Nanocrystals", J. Phys. Chem. *A108*, 7814 (2004)
190) Z. Zhou, M. Steigerwald, M. Hybertsen, L. Brus and R. Friesner, "Electronic Structure of Tubular Aromatic Molecules derived from the Metallic (5,5) Armchair Single Wall Carbon Nanotube", J. Am. Chem. Soc. *126*, 3597 (2004).
191) Jing Tang, Jason Fabbri, Richard D. Robinson, Yimei Zhu, Irving P. Herman, Michael L. Steigerwald & Louis E. Brus "Solid-Solution Nanoparticles: Use of A Nonhydrolytic Sol-gel Synthesis to Prepare HfO_2 and $Hf_xZr_{1-x}O_2$ Nanocrystals" Journal of Materials *16*, 1336 (2004)
192) F. Wang, G. Dukovic, L. Brus, T. Heinz, "Time Resolved Fluorescence of Carbon Nanotubes and Its Implications for Radiative Lifetimes" Phys. Rev. Lett. *92*, 177401 (2004).
193) Nguyen, Thuc-Quyen; Martel, Richard; Avouris, Phaedon; Bushey, Mark L.; Brus, Louis; Nuckolls, Colin. "Molecular Interactions in One-Dimensional Organic Nanostructures" J. Am. Chem. Soc. *126*, 5234 (2004)
194) Gordana Dukovic, Brian E. White, Zhiyong Zhou, Feng Wang, Steffen Jockusch, Tony F. Heinz, Nicholas J. Turro, Richard A. Friesner and Louis E. Brus, "Reversible Surface Oxidation and Efficient Luminescence Quenching in Semiconductor Single Wall Carbon Nanotubes" J. Am. Chem. Soc. *126*, 15269 (2004)
195) Feng Wang, Gordana Dukovic, Ernst Knoesel, Louis E. Brus, and Tony F. Heinz, "Observation of Rapid Auger Recombination in Excited Semiconducting Carbon Nanotubes" Phys. Rev. *B70*, 241403 (2004).
196) Matthew Y. Sfeir, Feng Wang, Limin Huang, Chia-Chin Chuang, J. Hone, Stephen P. O'Brien, Tony F. Heinz, Louis E. Brus, "Probing Electronic Transitions in Individual Carbon Nanotubes by Rayleigh Scattering" Science *306*, 1540 (2004)
197) Liwei Chen, R. Ludeke, Xiaodong Cui, Alejandro G. Schrott, Cherie R. Kagan Louis E. Brus, "Electrostatic field and Partial Fermi level pinning at the pentacene-SiO_2 interface" J. Phys. Chem. *109*, 1834-1838 (2005).
198) Peter L. Redmond, Alex J. Hallock, Louis E. Brus, " Electrochemical Ostwald Ripening of Colloidal Ag particles on Conductive Substrates", Nano Letters *5*, 131 (2005)
199) A. J. Hallock, P. L. Redmond, L. E. Brus, "Optical Forces between Metallic Particles", Proc. Nat. Acad. Sci. USA *102*, 1280 (2005)
200) Jing Tang, Franz Redl, Yimei Zhu, Theo Siegrist, Louis E. Brus and Michael L. Steigerwald, "A Low-Temperature Synthesis of TiO_2 Nanoparticles" , Nano Letters *5*, 543-548 (2005).
201) Zhiyong Zhou, Mike Steigerwald, Richard A. Friesner, Mark Hybertsen and Louis Brus, "Structure and Chemical Trends in Doped Silicon Nanocrystals: First Principles Calculations", Phys. Rev. *B71*, 245308 (2005)
202) F. Wang, G. Dukovic, L. Brus, T. Heniz, "The Optical Resonances of Carbon Nanotubes are Excitons" Science *308*, 838 (2005)
203) Robinson, Richard D.; Tang, Jing; Steigerwald, Michael L.; Brus, Louis E.; Herman, Irving P. "Raman scattering in $Hf_xZr_{1-x}O_2$ nanoparticles" Phys. Rev. *B71*, 115408/1-115408/8. (2005)
204) Byung Hee Hong, Joshua P. Small, Meninder S. Purewal, Asher Mullokandov, Matthew Y. Sfeir, Feng Wang, Ju Young Lee, Tony F. Heinz, Louis E. Brus, Philip Kim, and Kwang S. Kim "Extracting Sub-nanometer Single Shells from Ultralong Multi-Walled Carbon Nanotubes" Proc. Nat. Acad. Sci. USA *102*, 14155 (2005)
205) Jing Tang, Feng Zhang, Peter Zoogman, Jason Fabbri, Siu-Wai Chan, Yimei Zhu, Louis E. Brus, and Michael L. Steigerwald, "Martensitic Phase Transformation of

Isolated HfO_2, ZrO_2 and $Hf_xZr_{1-x}O_2$ ($0<x<1$) Nanocrystals" Adv. Functional Materials *15*, 1595 (2005)

206) Zhiyong Zhou, Michael L. Steigerwald, Richard A. Friesner, Louis Brus, and Mark S. Hybertsen, "Dopant Local Bonding and Electrical Activity near Si(001)-Oxide Interfaces", J. Appl. Phys. *98*, 076105 (2005)

207) G. Dukovic, F. Wang, D. Song, T. Heinz, and L.Brus, "Structural Dependence of Excitonic Optical Transitions and Band Gap Energies in Carbon Nanotubes", Nano Letters *5*, 2314 (2005).

208) Liwei Chen, Oksana Cherniavskaya, Alexander Shalek, Louis Brus, "Photoinduced Interfacial Charging and "Explosion" of Monolayer Pentacene Islands" Nano Letters *5*, 2241 (2005).

209) Zhiyong Zhou, Matthew Y. Sfeir, Lei Zhang, Mark Hybertsen, Michael Steigerwald and Louis Brus, "Graphite, Tubular PAHs, and the Diffuse Interstellar Bands", Astrophysical Journal *638*, L105 (2006).

210) Feng Wang, Matthew Y. Sfeir, Limin Huang, X.M. Henry Huang, Yang Wu, Jaehee Kim, James Hone, Stephen O'Brien, Louis E. Brus, and Tony F. Heinz , "Interactions between Individual Carbon Nanotubes Studied by Rayleigh Scattering Spectroscopy", Phys. Rev. Lett. *96*, 167401 (2006).

211) Matthew Y. Sfeir, Tobias Beetz, Feng Wang, Limin Huang, X.M. Henry Huang, Mingyuan Huang, J. Hone, Stephen P. O'Brien, J.A. Misewich, Tony F. Heinz, Lijun Wu, Yimei Zhu, and Louis E. Brus, "Optical Spectroscopy of Individual Single-Walled Carbon Nanotubes of Defined Chiral Structure" Science *312*, 554 (2006).

212) Gordana Dukovic, Milan Balaz, Peter Doak, Nina D. Berova, Ming Zheng, Robert S. Mclean, and Louis Brus "Racemic Single-walled carbon nanotubes exhibit circular dichroism when wrapped with DNA" , J. Am. Chem. Soc. *128*, 9004 (2006).

213) Peter L. Redmond, Erich C. Walter, Louis E. Brus, "Photo-induced Thermal Copper Reduction onto Gold Nanocrystals Under Potentiostatic Control", J. Phys. Chem. B *110*, 25158 (2006)

214) Erich C. Walter, Tobias Beetz, Matthew Y. Sfeir, Louis E. Brus and Michael L. Steigerwald. "Crystalline Graphite from an Organometallic Solution-Phase Reaction", J. Am. Chem. Soc. *128*, 15590 (2006)

215) Feng Wang, Weitao Liu, Y.Ron Shen, Yang Wu**,** Matthew Y. Sfeir, Limin Huang, James Hone, Stephen O'Brien, Louis E. Brus, and Tony F. Heinz "Multiphonon Raman Scattering from Individual Single-Walled Carbon Nanotubes" Phys. Rev. Lett. *98*, 047402 (2007)

216) Peter L. Redmond, Xiaomu Wu and Louis Brus, "Photo-Voltage and Photo-Catalyzed Growth in Citrate Stabilized Colloidal Silver Nanocrystals", J. Phys. Chem. C, *111*, 8942 (2007).

217) Elena Stolyarova (Polyakova), Kwang Taeg Rim, Sunmin Ryu, Janina Maultzsch, Philip Kim, Louis E. Brus, Tony F. Heinz, Mark S. Hybertsen, and George W. Flynn, "High-Resolution Scanning Tunneling Microscopy Imaging of Mesoscopic Graphene Sheets on an Insulating Surface", Pro. Nat. Acad. Sci. USA *104*, 9209 (2007).

218) Y. Wu, J. Maultzsch, E. Knoesel, B. Chandra, M. Huang. M. Sfeir, L. Brus, J. Hone, T. Heinz, "Variable Electron-Phonon Coupling in Isolated Metallic Carbon Nanotubes Observed by Raman Scattering", Phys. Rev. Lett. *99*, 027402 (2007).

219) F. Wang, G. Dukovic, Y. Wu, M. Hybertsen, L. Brus, T. Heinz, "Auger Recombination of excitons in semiconducting carbon nanotubes" **Springer Series in Chemical Physics** (2007) *88*, 683-685.

220) D. Song, F. Wang, G. Dukovic, M. Zheng, E. Semke, L. Brus, T. Heinz, "Observation of the optical Stark Effect in Semiconducting Carbon Nanotubes" **Springer Series in Chemical Physics** (2007), *88*, 674-676.

221) Peter L. Redmond, Louis E. Brus " "Hot Electron" Photo-Charging and Electrochemical Discharge Kinetics of Silver Nanocrystals", J. Phys. Chem. *C111*, 14849-14854. (2007)
222) T. Nyugen, R. Martel, M. Busby, P. Avouris, A. Carlsen, C. Nickolls, L. Brus "Self Assembly of 1-D Organic Semiconductor Nanostructures" Phys. Chem. Chem. Phys. *9*, 1515-1532 (2007).
223) D. Song, F. Wang, G. Dukovic, M. Zheng, E. Semke, L. Brus, T. Heinz "Direct Measurement of the Lifetime of Optical Phonons in Single-Walled Carbon Nanotubes" Phys. Rev. Lett. *100*, 225503-225506 (2008).
224) Millicent B. Smith, Katherine L. Page, Theo Siegrist, Michael L. Steigerwald, Peter L. Redmond, Erich C. Walter, Ram Seshadri, Louis E. Brus "Structural studies of Size Dependent phase transitions in nanoscale $BaTiO_3$" J. Am. Chem. Soc. *130*, 6955-6963 (2008).
225) Xiaomu Wu, Peter L. Redmond, Haitao Liu, Yihui Chen, Michael Steigerwald, and Louis Brus "Photovoltage Mechanism for Room Light Conversion of Citrate Stabilized Silver Nanocrystal Seeds to Large Nanoprisms" J. Am. Chem. Soc.*130*, 9500-9506 (2008).
226) Li Liu, Sunmin Ryu, Michelle R. Tomasik, Elena Stolyarova, Naeyoung Jung, Mark S. Hybertsen, Michael L. Steigerwald, Louis E. Brus, George W. Flynn "Graphene Oxidation: Thickness Dependent Etching and Strong Chemical Doping" Nano Lett. *8*, 1965-1970 (2008).
227) Louis Brus, "Noble Metal Nanocrystals: Plasmon Electron Transfer Photochemistry and Single Molecule Raman Spectroscopy". Accts. Chem. Res. *41*, 1742. (2008)
228) Sunmin Ryu, Melinda Y. Han, Janina Maultzsch, Tony F. Heinz, Philip Kim, Michael L. Steigerwald and Louis E. Brus "Reversible Basal Plane Hydrogenation of Graphene" Nano Lett. *8*, 4597-4602 (2008)
229) Stéphane Berciaud, Sunmin Ryu, Louis E. Brus, and Tony F. Heinz. "Probing the Intrinsic Properties of Exfoliated Graphene: Raman Spectroscopy of Free-Standing Monolayers" Nano Lett. *9*, 346-352 (2009).
230) Shu Li, Michael Steigerwald, Louis Brus "Surface States in the Photoionization of High Quality CdSe Core/Shell Nanocrystals" ACS Nano *3*, 1267-1273 (2009).
231) Y. Yu, Y. Zhao, S. Ryu, L. Brus, K. Kim and P. Kim "Electric field effect tuning of the graphene work function" Nano Lett. *9*, 3430-3434 (2009)
232) Vladimir Blagojevic, Yiing-Rei Chen, Michael Steigerwald, Louis Brus, Richard Friesner "Quantum Chemical Investigation of Cluster Models for TiO_2 Nanoparticles with Water-Derived Ligand Passivation: Studies of Excess Electron States and Implications for Charge Transport in the Gratzel Cell" J. Phys. Chem C *113*, 19806-19811 (2009).
233) Naeyoung Jung, Namdong Kim, Steffen Jockusch, Nickolas J. Turro, Philip Kim, Louis Brus "Charge Transfer Chemical Doping of Few Layer Graphenes: Charge Distribution and Band Gap Formation" Nano Lett. *9*, 4133-4137 (2009).
234) Haitao Liu, Sunmin Ryu, Zheyuan Chen, Michael L. Steigerwald, Colin Nuckolls, Louis E. Brus "Photochemical Reactivity of Graphene" J. Am. Chem. Soc. *131*, 17099-17101 (2009).
235) Berciaud, S., Voisin, C., Yan, H., Chandra, B., Caldwell, R., Shan, Y., Brus, L., Hone, J., Heinz, T. "Excitons and High-Order Optical Transitions in Individual Carbon Nanotubes: A Rayleigh scattering study " Phys. Rev. *B81*, 041414R (2010)
236) Louis Brus, "Commentary: Carbon Nanotubes, CdSe Nanocrystals and Electron-electron Interaction", Nano Lett. *10*, 363-365 (2010).

237) Zheyuan Chen, Stéphane Berciaud , Colin Nuckolls, Tony F. Heinz and Louis Brus "Energy Transfer from Individual Semiconductor Nanocrystals to Graphene" ACS Nano 2010, *4*, 2964.
238) Changgu Lee, Hugen Yan, Louis Brus, Tony Heinz, James Hone, Sunmin Ryu "Anomalous Lattice Vibrations of Single and Few-layer MoS_2" ACS Nano *4*, 2695 (2010).
239) Xiaomu Wu, Elizabeth Thrall, Haitao Liu, Michael Steigerwald, Louis Brus "Plasmon Induced Photovoltage and Charge Separation in Citrate Stabilized Gold Nanoparticles" J. Phys. Chem. C *114*, 12896 (2010).
240) Stephane Berciaud, Melinda Han, Kim Fai Mak, Louis Brus, Philip Kim, and Tony Heinz "Electron and optical phonon temperatures in electrically biased graphene" Phys. Rev.Lett. *104*, 227401 (2010).
241) V. Blagojevic, J. Carlo, L. Brus, M. Steigerwald, Y. Uemura, S. Billinge, W. Zhou, P. Stepehens, A. Aczel and G. Luke "Magnetic phase transition in V_2O_3 nanocrystals" Phys. Rev. B *82*, 094453/1-094531/6 (2010).
242) S. Ryu, L. Liu, S. Berciaud, Y. Yu, H. Liu, P. Kim, G. Flynn, L. Brus "Atmospheric Oxygen Binding and Hole Doping in Deformed Graphene on a SiO_2 Substrate" Nano Letters (2010) *10*, 4944-4951.
243) Naeyoung Jung, Andrew C. Crowther, Namdong Kim, Philip Kim, , and Louis Brus "Raman Enhancement on Graphene: Adsorbed and Intercalated Molecular Species" ACS Nano (2010) *4*, 7005-7013.
244) Namdong Kim, Kwang Kim, Naeyoung Jung, Louis Brus and Philip Kim "Synthesis and Electrical Characterization of Magnetic Bilayer Graphene Intercalate" Nano Letters (2011) *11*, 860-865.
245) C. Liu, Z. Li, Z. Chen, P. Klimov, L. Brus, T. Heniz " Imaging Stacking Order in Few-Layer Graphene" Nano Letters (2011) *11*, 164-169
246) S. Ryu, J. Maulzsch, M. Han, P. Kim, L. Brus "Raman Spectroscopy of Lithographically Patterned Graphene Nanoribbons" ACS Nano (2011) *5*, 4123-4130.
247) N. Jung, B. Kim, A. Crowther, N. Kim, C. Nuckolls, L. Brus "Optical Reflectivity and Raman Scattering in Few-Layer-Thick Graphene Highly Doped by K and Rb" Nano Letters (2011) *11*, 5708-5716.
248) E. Thrall, A. Crowther, Z. Yu, L. Brus, "R6G on Graphene: High Raman Detection Sensitivity, Yet Decreased Raman Cross-Section ", Nano Letters (2012), *12*, 1571-1577.
249) A. Crowther, A. Ghassaei, N. Jung, L. Brus, "Strong Charge-Transfer Doping of 1 to10 Layer Graphene by NO_2", ACS Nano (2012), *6*, 1865-1875.
250) Y. Yu, M. Han, S. Berciaud, A. Georgescu, T. Heinz, L. Brus, K. Kwang, P. Kim "High-resolution spatial mapping of the temperature distribution of a Joule self-heated graphene nanoribbon" Applied Physics Letters (2011), *99*, 183105.
251) L. Wang, Z. Chen, C. Dean, T. Taniguchi, K. Watanabe, L. Brus, J. Hone "Negligible Environmental Sensitivity of Graphene in a Hexagonal Boron Nitride/Graphene/h-BN Sandwich Structure" ACS Nano (2012) *6*, 9314-9319.
252) L. Liu, Z. Chen, L. Wang, E. Polyakova, T. Taniguchi, K. Watanabe, J. Hone, G. Flynn, L. Brus "Slow Gold Adatom Diffusion on Graphene: Effect of Silicon Dioxide and Hexagonal Boron Nitride Substrates" J. Phys. Chem. B. (2013), *117*, 4305-4312.
253) Xavier Roy, Chul-Ho Lee, Andrew C. Crowther, Christine L. Schenck, Tiglet Besara, Roger A. Lalancette, Theo Siegrist, Peter W. Stephens, Louis E. Brus, Philip Kim, Michael L. Steigerwald, Colin Nuckolls "Nanoscale Atoms in Solid-State Chemistry" Science (2013), *341*, 157-160

254) Stephane Berciaud, Xianglong Li, Han Htoon, Louis Brus, Stephen Doorn, Tony Heinz, "Intrinsic Line Shape of the Raman 2D-Mode in Freestanding Graphene Monolayers" Nano Letters (2013), *13*, 3517-3523.
255) Jing Tang, Thomas Hughes, Michael Steigerwald, Louis Brus, Richard Friesner "Realistic Cluster Modeling of Electron Transport and Trapping in Solvated TiO_2 Nanoparticles" J. Am. Chem. Soc. (2013), *134*, 12028-12042.
256) Elizabeth Thrall, Asher Steinberg, Xiaomu Wu, Louis Brus "The Role of Photon Energy and Semiconductor Substrate in the Plasmon-Mediated Photooxidation of Citrate by Silver Nanoparticles" J. Phys. Chem. C (2013) *117*, 26238-26247.
257) Jing Zhang, Michael Steigerwald, Louis Brus, Richard Friesner "Covalent OH bonds as Electron Traps in Proton-rich Rutile TiO_2 Nanoparticles" Nano Letters (2014) *14*, 1785-1789.
258) Michael Novak, Sumedh Surwade, Jason Prokop, Kirill Bolotin, James Hone, Louis Brus, Colin Nuckolls, Haitao Liu "Visualizing Individual Carbon Nanotubes with Optical Microscopy" J. Am. Chem. Soc. (2014), *136*, 8536-8539.
259) Chen, Z.; Darancet, P.; Wang, L.; Crowther, A.; Gao, Y.; Dean, C.; Taniguchi, T.; Watanabe, K.; Hone, J.; Marianetti, C.; Brus, L. "Physical Adsorption and Charge Transfer of Molecular Br_2 on Graphene" ACS Nano (2014) *8*, 2943-2950.
260) Brus, L. "Size, Dimensionality and Strong Electron Correlation in Nanoscience" Accts. Chem. Res. (2014), *47*, 2951-2959.
261) Lee, C.; Liu, L.; Bejger, C.; Turkiewicz, A.; Goko, T.; Arguello, C.; Frandsen, B.; Cheung, S.; Medina, T.; Munsie, T.; D'Ortenzio, R.; Luke, G.; Besara, T.; Lalancette, R.; Tiegrist, T.; Stephens, P.; Crowther, A.; Brus, L.; Matsuo, Y.; Nakamura, E.; Uemura, Y.; Kim, P.; Nuckolls, C.; Steigerwald, M.; Roy, X. "Ferromagnetic Ordering in Superatomic Solids" J. Am. Chem. Soc. (2014), *136*, 16926-16931.
262) Hill, H.; Rigosi, A.; Roquelet, C.; Chernikov, A.; Berkelbach, T.; Reichman. D.; Hybertsen, M.; Brus, L.; Heinz. T. "Observation of Excitonic Rydberg States in Monolayer MoS_2 and WS_2 by Photoluminescence Excitation Spectroscopy", Nano Letters (2015) *15*, 2992-2997.
263) Farid, A.; Guo, Y.; Thrall, E.; Elbaz, G.; Crowther, A.; Brus, L. "Production of Supercapacitors from Liquid-Phase Exfoliated Graphene", Johns Hopkins Undergraduate Research Journal, spring 2015.
264) Guo, Y., Sun, D., Ouyang, B., Raja, A., Song, J., Heinz, T., Brus L. "Probing the Dynamics of the Metallic-to-Semiconducting Structural Phase Transformation in MoS_2 Crystals", Nano Letters (2015) *15*, 5081-5088.
265) Guo, Y.; Smith, R.; Yu, Z.; Efetov, K.; Wang, J.; Kim, P.; Bazant, M.; Brus, L. "Li Intercalation into Graphite: Direct Optical Imaging and Cahn-Hilliard Reaction Dynamics", J. Phys. Chem. Lett. (2016), *7*, 2151-2156.
266) Raja, A., Montoya Castillo, A., Zultak, J., Zhang, X., Ye, Z., Roquelet, C., Chenet, D., van der Zande, A., Huang, P., Jockusch, S., Brus. L. "Energy Transfer from Quantum Dots to Graphene and MoS2: The Role of Adsorption and Screening in Two-Dimensional Materials", Nano Letters (2016), *16*, 2328-2333.
267) Brus, L. "Plasmon-driven chemical synthesis: Growing gold nanoprisms with light", *News and Views article* in Nature Materials (2016), *15*, 824-825.
268) Yaffe, O., Guo, Y., Tan, L., Egger, D., Hull, T., Stoumpos, C., Zheng, F., Heinz, T., Kronik, L., Kanatzidis, M., Owen, J., Rappe, A., Pimenta, M., Brus, L. "Local Polar Fluctuations in Lead Halide Perovskite Crystals", Phys. Rev. Lett. (2017), *118*, 136001.
269) Raja, A., Chaves, A., Yu, J., Arefe, G., Hill, H., Rigosi, A., Berkelbach, T., Nagler, P., Schuller, C., Korn, T., Nuckolls, C., Hone, J., Brus, L., Heinz, T., Reichman, T.,

Chernikov, A. “Coulomb Engineering of the bandgap and excitons in 2D semiconductors” Nature Comm. (2017), *8*, 15251.

270) Atallah, T., Wang, J., Bosch, M., Seo, D., Burke, R., Moneer, O., Zhu, J., Theibault, M., Brus, L., Hone, J., Zhu, X.-Y. “Electrostatic Screening of Charged Defects in Monolayer MoS_2 “ J. Phys. Chem. Lett. (2017), *8*, 2148-2152.

271) Owen, J., Brus, L. “Chemical Synthesis and Luminescence Applications of Colloidal Semiconductor Quantum Dots”, *Perspective article* in J. Am. Chem. Soc. (2017), *139*, 10939-10943.

272) Guo, Y., Yaffe, O., Paley, D., Beecher, A., Hull, T., Szpak, G., Owen, J., Brus, L., Pimenta, M. “Interplay between organic cations and inorganic framework and incommensurability in hybrid lead-halide perovskite CH3NH3PbBr3” Phys. Rev. Mater. (2017), *1*, 042401(R).

273) Zhao, S., Elbaz, G., Bediako, D., Yu, C., Efetov, D., Guo, Y., Ravichandran, J., Min, K., Hong, S., Taniguchi, T., Watanable, K., Brus, L., Roy, X., Kim, P. “Controlled Electrochemical Intercalation of Graphene/h-BN van der Waals Heterostructures” Nano Letters (2018), *18*, 460-466.