Laurence D Marks

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Professor Laurence Marks was born in Barnet, London in 1954, and after attending Trinity School of John Whitgift in Croydon was awarded a scholarship to Kings College Cambridge in 1973. After completing a BS in Natural Sciences (Chemistry) he went on to do a PhD in the Department of Physics, Cavendish Laboratory with Professor A. Howie, followed by postdoctoral work with Professor A. Howie and Dr. D. J. Smith in Cambridge, moving to Arizona State University in 1983 to work with Professor J. M. Cowley. He joined the Department of Materials Science and Engineering at Northwestern University in March 1985, being promoted to Associate Professor in June 1986 and full Professor in June 1992.

He has a long history of pioneering new methods, ranging from technical approaches to imaging materials to new numerical algorithms for solving surface structures as well as algorithms for density functional fixed-point methods. While the largest number of his publications have involved transmission electron microscopy, both experimental and theoretical, he has also worked extensively in other areas. Most often cited of these is his work in nanoparticles, where a class of particles he discovered have become known as the “Marks Decahedron”. Other areas include combining experimental and theoretical approaches to understand surface structures for which he was awarded the 2017 ICSOS Surface Structure Prize, as well as many other contributions to understanding structures for which he received the 2016 Warren Award of the American Crystallography Association. He has also worked extensively in nanoscale tribology, including pioneering ways to image samples during sliding and dislocation based models of sliding and wear. More recently he has ventured into aqueous corrosion and high temperature oxidation, initially for hip implants but more recently the nonequilibrium development of protective oxide films at the nanoscale.

Significant Science, in approximately chronological order

1. Discovered what has now become known as the “Marks Decahedron”. This is the equilibrium shape of five-fold multiply twinned particles (1-3), and is one of the three stable structures of fcc materials at the nanoscale, the other two being icosahedra and single crystals. The term has now become a generic, and is used without citation.

2. The first atomic resolution imaging of nanoparticles in 1981 (4-6), joint with D. J. Smith. This work was the first detailed study of the structure of nanoparticles using HREM, and showed details such as internal structure and dislocations. The early work on experimental imaging was reviewed in 1994 (7), a widely cited paper.

3. The first profile imaging of surfaces in the early 1980’s (8, 9), joint with D. J. Smith, as well as the conditions needed (10-14) for direct interpretation of images of surfaces, taking into account both channeling and localization. This method was called “Profile Imaging”, and is

now widely used in the study of heterogeneous catalysis and nanoparticle research, the term having become a generic frequently used without citation.

4. The first experimental observation of surface plasmons in a STEM in 1982 (15), what has now become known as Aloof Scattering. These experiments showed that there were energy losses when the electron beam was outside of MgO cubes, and demonstrated that they could be explained in terms of the appropriate dielectric loss function.

5. Demonstration that structural fluctuations in small particles observed in the electron microscopes was not simply a consequence of the electron beam, but rather was due to the fact that the energy barriers between the different structures was relatively small (16-22). This work also was the first to introduce the concept of a phase map for small particles as a function of size and temperature (17, 20), a concept that still appears to be valid.

6. Developed the first fully UHV-HREM transmission electron microscope with 0.2nm resolution joint with Hitachi (23, 24), later extended with a multichamber surface science system (25). While there had previously been UHV electron microscopes constructed using cryocooling of the sample they were not fully UHV and rather limited. There had also been some other attempts to build UHV-HREM instruments, but they were not successful. To date it is the only instrument that has demonstrated room-temperature operation with sensitive surfaces such as the Si (001) 2x1 surface.

7. A body of work of various aspects of plan-view imaging and diffraction of surfaces as well as experimental studies of semiconductor surfaces both when clean and with metals on them (23, 24, 26-49).

8. A body of work on electron radiation damage phenomena at the surface of oxides (50-62). This work includes both experimental work on the atomistic structure of the surface and selvedge regions, as well as work understanding the symmetry conditions for the phase transitions and kinetic modelling of the moving boundary problem.

9. A body of work on local structure in high-temperature superconductors as well as the growth and properties of Josephson junctions (63-88). Almost all of this work was highly collaborative, with groups from other fields as well as other Universities.

10. Work on in-situ growth in the UHV-HREM system with its coupled multichamber science chamber (48, 89-104). In addition to some work for metals on semiconductor surfaces, this involved two projects. The first was to grow cubic boron nitride (BN), the second quasicrystalline thin films. The work on BN produced atomic sheets of hexagaonal BN where it was demonstrated that the local bonding only involved even numbers of rings, work which has been well cited.

11. Pioneered the use of directly methods with electrons or x-rays for surfaces to solve unknown structures (92, 105-112). While others had tried to use conventional direct methods for surfaces before, they were not successful. This is because these methods could not handle

cases where very strong beams are not measurable because they overlap with bulk diffraction spots that are many orders of magnitude stronger. He developed methods that could handle this.

12. Exploiting the direct methods, solution of a number of complicated metal-semiconductor surface structures that could not be solved by other approaches (92, 94, 113-116). These papers are moderately well cited.
13. Work on the connection between mathematical methods such as non-convex sets and crystallographic phase problems (117), as well as the connection between dynamical diffraction and crystallographic phase invariants and the conditions when direct methods will work with electrons (117-128). This work laid the foundation for direct methods with Precession Electron Diffraction that were developed later.
14. The first precession electron diffraction (PED) camera (student Chris Own) in the US (122), as well as a large body of work including the first dynamical analysis of PED (123), and many other contributions to the theory behind and experimental application of the method (117, 119-121, 124-132).
15. Pioneering work on the surface structure of strontium titanate. He determined the structure of what has become the standard model for the titanium-rich surface, a double layer (133). Following on from the original work there is a relatively large body of work on other structures in the system as well as other oxides analyzed by a range of methods including electron diffraction, profile imaging, scanning probe microscopy and density functional theory calculations (134-162), which has recently been reviewed (163). This work is well cited.
16. Pioneering work to develop a fast method of determining the Local Surface Plasmon Resonances (LSPR) of individual nanoparticles and image exactly the same nanoparticle by electron microscopy (164-166). The methods developed are now widely used around the world for correlated measurements. They have been exploited to obtain statistically significant measurements of the size, shape and LSPR of thousands of nanoparticles to determine accurate relationships between them (167-173), work frequently cited by others.
17. Pioneered the use of in-situ measurements of tribological processes (174-181). This work involved sliding a scanning probe (STM or AFM) along a surface inside a transmission electron microscope and directly imaging processes taking place at the surface. The work has been relatively widely cited in the (smaller) nanoscale tribology community with frequent invited presentations. Several other groups around the world have adopted the method with varying degrees of success.
18. Complementing the in-situ tribological measurements, the development of material science based dislocation models to understand nanoscale tribology processes (182-186). This includes modelling friction via the motion of interfacial dislocations and Bowden-Tabor ploughing as creep.

19. Pioneered the use of spatially resolved nanoindentation of cement to understand the properties (187-189), work which is well cited in the smaller field of scientists active in cement research.

20. Developed a robust code for solving the self-consistent (fixed-point) problem in density functional theory (190), and a more recent form which simultaneously solves the fixed-point problem for the density and atomic positions (191). The robust code involved analysis of the best approach using established Broyden methods, the second went beyond the established mathematical literature. Both these algorithms are the recommended ones used in the Wien2k code by about two thousand groups around the world. He is now officially one of the authors of the Wien2k code (192).

21. Identification of a graphitic layer *in-vivo* in metal-on-metal hip implants (193), as well as a body of work on hard phases in these materials as well as corrosion of them (194-203). There remain serious issues with hip and other implant materials, but the current political and legal is currently preventing further research to develop better materials. This work laid the foundations for a larger effort on corrosion, funded by ONR as a larger Multi-Investigator University Research Initiative, Corrosion in 4D: http://MURI4D.numis.northwestern.edu.

22. Returning relatively recently to the topic of nanoparticles, a body of work combining analysis of nanoparticle structure (both metals and oxides) with the thermodynamics and kinetics of growth and their catalytic performance (154-156, 158, 160, 204-228). Highlights of this work include a new model for the Wulff shape of nanoalloys showing size-dependent segregation and shape effects and the first model to correctly predict the growth shape of multiply twinned particles (as against the thermodynamic shape).

23. Moving in to a new area, aqueous corrosion and high temperature oxidation a number of recent publications have investigated both experimental structures at the nanoscale (229-231) as well as density functional models (232, 233). A recent significant paper describes the formation of Nonequilibrium Solute Capture in oxides, a new way of understanding protective oxide films which is disruptive new science (234).

24. Last, but certainly not least, by combining expertise in a new research area, flexoelectricity (235-237) with prior expertise in tribology, combined the two to explain triboelectricity (238).

Publications can be found at www.numis.northwestern.edu/Research/Articles/articles.shtml

References Cited Above

1. Marks LD. The structure of small silver particles: University of Cambridge; 1980.
2. Marks LD. Modified Wulff Constructions for Twinned Particles. J Cryst Growth. 1983;61(3):556-66.
3. Marks LD. Surface-Structure and Energetics of Multiply Twinned Particles. Philos Mag A-Phys Condens Matter Struct Defect Mech Prop. 1984;49(1):81-93.

4. Marks LD, Smith DJ. High-Resolution Studies of Small Particles of Gold and Silver .1. Multiply-Twinned Particles. J Cryst Growth. 1981;54(3):425-32.
5. Smith DJ, Marks LD. High-Resolution Studies of Small Particles of Gold and Silver .2. Single-Crystals, Lamellar Twins and Polyparticles. J Cryst Growth. 1981;54(3):433-8.
6. Smith DJ, Marks LD. Direct Lattice Imaging of Small Metal Particles. Philos Mag A-Phys Condens Matter Struct Defect Mech Prop. 1981;44(3):735-40.
7. Marks LD. Experimental Studies of Small-Particle Structures. Rep Prog Phys. 1994;57(6):603-49.
8. Marks LD. Direct Imaging of Carbon-Covered and Clean Gold (110) Surfaces. Phys Rev Lett. 1983;51(11):1000-2.
9. Marks LD, Smith DJ. Direct Surface Imaging in Small Metal Particles. Nature. 1983;303(5915):316-7.
10. Marks LD. Bloch Wave Hrem. Ultramicroscopy. 1984;14(4):351-5.
11. Marks LD. High-Resolution Surface Imaging. Acta Crystallogr Sect A. 1984;40:C390-C.
12. Marks LD. Direct Atomic Imaging of Solid-Surfaces .1. Image Simulation and Interpretation. Surf Sci. 1984;139(1):281-98.
13. Marks LD. Dispersive Equations for High-Resolution Imaging and Lattice Fringe Artifacts. Ultramicroscopy. 1984;12(3):237-42.
14. Marks LD. Image Localization. Ultramicroscopy. 1985;18(1-4):33-7.
15. Marks LD. Observation of the Image Force for Fast Electrons near an Mgo Surface. Solid State Commun. 1982;43(10):727-9.
16. Marks LD, Ajayan PM, Dundurs J. Quasi-Melting of Small Particles. Ultramicroscopy. 1986;20(1-2):77-82.
17. Ajayan PM, Marks LD. Quasimelting and phases of small particles. Phys Rev Lett. 1988;60(7):585-7.
18. Dundurs J, Marks LD, Ajayan PM. Structural Fluctuations in Small Particles. Philos Mag A-Phys Condens Matter Struct Defect Mech Prop. 1988;57(4):605-20.
19. Ajayan PM, Marks LD. Experimental-Evidence for Quasimelting in Small Particles. Phys Rev Lett. 1989;63(3):279-82.
20. Ajayan PM, Marks LD. Phase Instabilities in Small Particles. Phase Transit. 1990;24-6(1):229-58.
21. Narayanaswamy D, Marks LD. Transformations in Quasi-Melting. Z Phys D-Atoms Mol Clusters. 1993;26:S70-S2.
22. Doraiswamy N, Marks LD. Electron beam induced small particle transformations: Temperature. Surf Sci. 1996;348(1-2):L67-L9.
23. Ai R, Buckett MI, Dunn D, Savage TS, Zhang JP, Marks LD. UHV Microscopy of Surfaces. Ultramicroscopy. 1991;39(1-4):387-94.
24. Marks LD, Ai R, Bonevich JE, Buckett MI, Dunn D, Zhang JP, Jacoby M, Stair PC. UHV Microscopy of Surfaces. Ultramicroscopy. 1991;37(1-4):90-102.
25. Collazo-Davila C, Landree E, Grozea D, Jayaram G, Plass R, Stair PC, Marks LD. Design and Initial performance of an Ultrahigh Vacuum Sample Preparation, Evaluation, Analysis and Reaction (SPEAR) system. Journal of the Microscopy Society of America. 1995;1:267-79.
26. Ma Y, Marks LD. Surface Phenomena in Rheed and Rem. Acta Crystallogr Sect A. 1990;46:594-606.
27. Ma Y, Marks LD. Bloch Waves and Multislice in Transmission and Reflection Diffraction. Acta Crystallogr Sect A. 1990;46:11-32.
28. Marks LD, Savage TS, Zhang JP, Ai R. Validity of the Kinematical Approximation in Transmission Electron-Diffraction for Surfaces, Revisited. Ultramicroscopy. 1991;38(3-4):343-7.
29. Dunn DN, Xu P, Marks LD. Problems with the Use of Surface Reconstructions as Indicators of a Well-Ordered Surface. J Cryst Growth. 1992;125(3-4):543-7.

30. Dunn DN, Zhang JP, Marks LD. UHV Microscopy of the Reconstructed Au(001) Surface. Surf Sci. 1992;260(1-3):220-8.
31. Ma Y, Marks LD. Developments in the Dynamic Theory of High-Energy Electron Reflection. Microsc Res Tech. 1992;20(4):371-89.
32. Marks LD. Registry and UHV transmission electron diffraction of surfaces. Ultramicroscopy. 1992;45(1):145-54.
33. Xu P, Marks LD. Intensities of Surface Diffraction Spots in Plan View. Ultramicroscopy. 1992;45(1):155-7.
34. Dunn DN, Xu P, Marks LD. UHV Transmission Electron-Microscopy of Ir(001) .1. Microstructure of the (1x1) and the Reconstructed (5x1) Surfaces. Surf Sci. 1993;294(3):308-21.
35. Jayaram G, Xu P, Marks LD. Structure of Si(100)-(2x1) Surface Using UHV Transmission Electron-Diffraction. Phys Rev Lett. 1993;71(21):3489-92.
36. Marks LD, Ai R, Savage S, Zhang JP. Ultrahigh-Vacuum Microscopy of the Si(111) Boron Root-3x-Root- 3 R30 Degrees Surface. J Vac Sci Technol A-Vac Surf Films. 1993;11(3):469-73.
37. Marks LD, Xu P, Dunn DN. UHV Transmission Electron-Microscopy of Ir(001) .2. Atomic Positions of the (5x1) Reconstructed Surface from HREM and R- Factor Refinements. Surf Sci. 1993;294(3):322-32.
38. Savage TS, Xu P, Marks LD. Thermal-Shock Cleavage of Silicon (111) Thin-Crystals. J Appl Phys. 1993;73(3):1039-42.
39. Xu P, Dunn D, Zhang JP, Marks LD. Atomic Imaging of Surfaces in Plan View. Surf Sci. 1993;285(1-2):L479-L85.
40. Jayaram G, Doraiswamy N, Marks LD, Hilton MR. Ultrahigh-Vacuum High-Resolution Transmission Electron- Microscopy of Sputter-Deposited Mos2 Thin-Films. Surf Coat Technol. 1994;68:439-45.
41. Jayaram G, Marks LD. Atomic structure of the Si(100)-(5x3)-Au surface. Surf Rev Lett. 1995;2(6):731-9.
42. Marks LD, Plass R. Atomic-Structure of Si(111)-(5x2)-Au from High-Resolution Electron-Microscopy and Heavy-Atom Holography. Phys Rev Lett. 1995;75(11):2172-5.
43. Plass R, Marks LD. UHV Transmission Electron-Microscopy Structure Determination of the Si(111)-(Root-3x-Root-3)R30-Degrees-Au Surface. Surf Sci. 1995;342(1-3):233-49.
44. Williams ED, Marks LD. New and emerging techniques for imaging surfaces. Crit Rev Surf Chem. 1995;5(4):275-303.
45. Plass R, Marks LD. Room temperature deposition of gold onto the diffuse and sharp diffraction spot Si(111)-(root 3X root 3)R30 degrees Au surfaces. Surf Sci. 1996;358(1-3):42-6.
46. Plass RA. Gold Induced Si(111) Surface Reconstruction Studied by Ultrahigh Vacuum Transmission Electron Microscopy: Northwestern University; 1996.
47. Grozea D, Landree E, Marks LD. Surface roughening by electron beam heating. Appl Phys Lett. 1997;71(16):2301-3.
48. Landree E, Grozea D, CollazoDavila C, Marks LD. UHV high-resolution electron microscopy and chemical analysis of room-temperature Au deposition on Si(001)-2x1. Phys Rev B. 1997;55(12):7910-6.
49. Dunn DN, Ai R, Savage TS, Zhang JP, Marks LD. Preparation and Detection of Reconstructed Plan-View Surfaces. Ultramicroscopy. 1991;38(3-4):333-42.
50. Petford AK, Marks LD, O'Keeffe M. Atomic imaging of oxygen desorption from tungsten trioxide. Surf Sci. 1986;172(2):496-508.
51. Buckett MI, Strane J, Luzzi DE, Zhang JP, Wessels BW, Marks LD. Electron-Irradiation Damage in Oxides. Ultramicroscopy. 1989;29(1-4):217-27.
52. Fan HJ, Marks LD. Phase-Transitions in V2O5 in a High-Resolution Electron- Microscope. Ultramicroscopy. 1989;31(4):357-64.
53. Ma Y, Marks LD. Ballistic Surface-Diffusion. Ultramicroscopy. 1989;31(2):193-8.

54. Singh SR, Marks LD. Diffusion During Electron-Beam-Induced Reduction of Tungsten Trioxide. Philos Mag Lett. 1989;60(1):31-6.

55. Zhang JP, Marks LD. Symmetry in Diet Phase-Transitions. Surf Sci. 1989;222(1):13-20.

56. Buckett MI, Marks LD. Electron-Irradiation Damage in NiO. Surf Sci. 1990;232(3):353-66.

57. Bonevich JE, Marks LD. Electron-Radiation Damage of Alpha-Alumina. Ultramicroscopy. 1991;35(2):161-6.

58. Ai R, Fan HJ, Marks LD. Electron-Stimulated Surface-Reactions in ReO_3. Surf Sci. 1992;274(2):L559-L67.

59. Marks LD, Zhang JP. Is There an Electron Wind. Ultramicroscopy. 1992;41(4):419-22.

60. Ai R, Fan HJ, Marks LD. Phase-Transition Kinetics in Diet of Vanadium Pentoxide .1. Experimental Results. Surf Sci. 1993;280(3):369-74.

61. Marks LD, Volpert VA, Ai R. Phase-Transition Kinetics of Vanadium Pentoxide .2. Theoretical Results. Surf Sci. 1993;280(3):375-82.

62. Volpert VA, Marks LD, Ai R. Phase-Transition in Metal-Oxides under Irradiation. Phase Transit. 1993;44(4):235-54.

63. Zhang JP, Groenke DA, Zhang H, Deloach DI, Dabrowski B, Poeppelmeier KR, Dravid VP, Marks LD. Local-Structure of $Y_{1-X}Ca_xSr_2Cu_2O_7$ Superconductors. Physica C. 1992;202(1-2):51-60.

64. Zhang JP, Li DJ, Marks LD, Lin CH, Eades JA, Sodonis A, Wolbach W, Chabala JM, Levisetti R. Microstructure and Properties of Cu-Rich 123 .1. Copper at the Grain-Boundaries. J Mater Res. 1992;7(3):572-9.

65. Zhang JP, Li DJ, Boldt C, Plass R, Dravid V, Marks LD, Lin CH, Eades JA, Sodonis A, Wolbach W, Chabala JM, Levisetti R. Microstructure and Properties of Cu-Rich 123 .2. Homogeneous Copper and High Magnetic Jc. J Mater Res. 1993;8(6):1232-9.

66. Zhang H, Wang YY, Dravid VP, Marks LD, Han PD, Payne DA, Radaelli PG, Jorgensen JD. Identity of Planar Defects in the Infinite-Layer Copper-Oxide Superconductor. Nature. 1994;370(6488):352-4.

67. Zhang JP, Groenke DA, Dabrowski B, Poeppelmeier KR, Marks LD. Ga Induced Line Defects and Superconductivity in $Y_xSr_2Cu_2GaO_7$. Physica C. 1994;227(3-4):259-66.

68. Zhang JP, Wang YY, Ai R, Platt CE, Zhang Y, Shi DL, Hinks DC, Marks LD. Atomic imaging of Ba0.6K0.4BiO3 using low-dose techniques. Physica C: Superconductivity. 1994;219(1-2):191-4.

69. Chmaissem O, Argyriou DN, Hinks DG, Jorgensen JD, Storey BG, Zhang H, Marks LD, Wang YY, Dravid VP, Dabrowski B. Chromium clustering and ordering in $Hg_{1-x}Cr_xSr_2CuO_{4+\mathrm{delta}}$. Phys Rev B. 1995;52(21):15636-43.

70. Dean KA, Buchholz DB, Marks LD, Chang RPH, Vuchic BV, Merkle KL, Studebaker DB, Marks TJ. $YBa_2Cu_3O_{7-\mathrm{Delta}}$ on Mgo Films Grown by Pulsed Organometallic Beam Epitaxy and a Grain-Boundary Junction Application. J Mater Res. 1995;10(11):2700-7.

71. Vuchic BV, Merkle KL, Dean KA, Buchholz DB, Chang RPH, Marks LD. Integrated Multilayer Sputter-Induced 45-Degrees $YBa_2Cu_3O_{7-X}$ Grain-Boundary Junctions. Appl Phys Lett. 1995;67(7):1013-5.

72. Vuchic BV, Merkle KL, Dean KA, Buchholz DB, Chang RPH, Marks LD. Sputter-Induced Grain-Boundary Junctions in $YBa_2Cu_3O_{7-X}$ Thin- Films on MgO. J Appl Phys. 1995;77(6):2591-4.

73. Vuchic BV, Merkle KL, Funkhouser JW, Buchholz DB, Dean KA, Chang RPH, Marks LD. $YBa_2Cu_3O_{7-X}$ 45-Degrees- 001 Tilt Grain-Boundaries Induced by Controlled Low-Energy Sputtering of MgO Substrates - Transport- Properties and Atomic-Scale Structure. IEEE Trans Appl Supercond. 1995;5(2):1225-8.

74. Wang YY, Zhang H, Dravid VP, Marks LD, Han PD, Payne DA. A TEM study of the incommensurate modulated structure in $Sr_2CuO_{3+\mathrm{delta}}$ superconductor synthesized under high pressure .A. Evolution of the incommensurate modulated structure and the electronic structure with post-heat treatment. Physica C. 1995;255(3-4):247-56.

75. Zhang H, Marks LD, Wang YY, Dravid VP, Han P, Payne DA. Structure of Planar Defects in $(Sr_{0.9}Ca_{0.3})_{(1.1)}CuO_2$ Infinite- Layer Superconductors by Quantitative High-Resolution Electron- Microscopy. Ultramicroscopy. 1995;57(1):103-11.

76. Zhang H, Wang YY, Marks LD, Dravid VP, Han PD, Payne DA. A TEM study of the incommensurate modulated structure in Sr_2CuO_{3+x} superconductors synthesized under high pressure .B. Structural model. Physica C. 1995;255(3-4):257-65.

77. Otzschi KD, Poeppelmeier KR, Salvador PA, Mason TO, Zhang H, Marks LD. A new series of layered cuprates $(ACuO_{2.5})_2(ATiO_3)_m$: $Dy_2Ba_2Ca_2Cu_2Ti_4O_{17}$, m=4. J Am Chem Soc. 1996;118(37):8951-2.

78. Sarjeant GM, Greenwood KB, Poeppelmeier KR, Zhang H, Salvador PA, Mason TO, Marks LD. Synthesis and structure of $LaSr_2CuTiO_{6.5}$: A new oxygen- deficient Ruddlesden-Popper phase. Chem Mat. 1996;8(12):2792-8.

79. Vuchic B, Merkle KL, Char K, Buchholz DB, Chang RPH, Marks LD. Bi-epitaxial grain boundaries in $YBa_2Cu_3O_{7-x}$ thin films prepared by pulsed laser deposition and pulsed organometallic beam epitaxy: Direct comparison of transport properties and grain boundary structure. J Mater Res. 1996;11(10):2429-39.

80. Vuchic BV, Merkle KL, Baldo PM, Dean KA, Buchholz DB, Chang RPH, Zhang H, Marks LD. The formation, transport properties and microstructure of 45 degrees 001 grain boundaries induced by epitaxy modification in $YBa_2Cu_3O_{7-x}$ thin films. Physica C. 1996;270(1-2):75-90.

81. Chmaissem O, Jorgensen JD, Hinks DG, Storey BG, Dabrowski B, Zhang H, Marks LD. Structure and superconductivity in Cr-substituted $HgBa_2CuO_{4+delta}$. Physica C. 1997;279(1-2):1-10.

82. Otzschi KD, Poeppelmeier KR, Salvador PA, Mason TO, Sinkler W, Zhang H, Marks LD. A new series of layered pure perovskites $(ACuO_5)_2(ATiO_3)_m$. Physica C. 1997;282:837-8.

83. Salvador PA, Otzschi KD, Zhang H, Dabrowski B, Jorgensen JD, Mason TO, Marks LD, Poeppelmeier KR. Genesis of superconductivity in the layered cuprates: $(ACuO_5)_2(ATiO_3)_m$; 2<=m<=4. Physica C. 1997;282:959-60.

84. Huang Y, Vuchic BV, Carmody M, Baldo PM, Merkle KL, Buchholz DB, Mahajan S, Lei JS, Markworth PR, Chang RPH, Marks LD. The mechanism of sputter-induced epitaxy modification in YBCO (001) films grown on MgO (001) substrates. J Mater Res. 1998;13(12):3378-88.

85. Carmody M, Landree E, Marks LD, Merkle KL. Determination of the current density distribution in Josephson junctions. Physica C. 1999;315(3-4):145-53.

86. Carmody M, Merkle KL, Huang Y, Marks LD, Moeckly BH. The relation between barrier structure and current uniformity in YBCO Josephson junctions. Interface Sci. 2000;8(2-3):231-42.

87. Carmody M, Moeckly BH, Merkle KL, Marks LD. Spatial variation of the current in grain boundary Josephson junctions. J Appl Phys. 2000;87(5):2454-9.

88. Carmody M, Marks LD, Merkle KL. Current transport along grain boundaries in d-wave superconductors. Physica C. 2002;370(4):228-38.

89. Marks LD, Bengu E, Gilmore CJ. New methods of imaging surfaces (and buried interfaces). J Electron Microsc. 1997;46(3):207-14.

90. Bengu E, Collazo-Davila C, Grozea D, Landree E, Widlow I, Guruz M, Marks LD. In situ growth and characterization of ultrahard thin films. Microsc Res Tech. 1998;42(4):295-301.

91. Collazo-Davila C, Bengu E, Leslie C, Marks LD. Formation of BN nanoarches: Possibly the key to cubic boron nitride film growth. Appl Phys Lett. 1998;72(3):314-6.

92. Collazo-Davila C, Grozea D, Marks LD. Determination and refinement of the Ag/Si(111)-(3x1) surface structure. Phys Rev Lett. 1998;80(8):1678-81.

93. Collazo-Davila C, Bengu E, Marks LD, Kirk M. Nucleation of cubic boron nitride thin films. Diam Relat Mat. 1999;8(6):1091-100.

94. Grozea D, Bengu E, Collazo-Davila C, Marks LD. Structure determination of the Ge(111)-(3x1)Ag surface reconstruction. Surf Rev Lett. 1999;6(6):1061-5.

95. Grozea D, Landree E, Collazo-Davila C, Bengu E, Plass R, Marks LD. Structural investigations of metal-semiconductor surfaces. Micron. 1999;30(1):41-9.
96. Grozea D, Bengu E, Marks LD. Surface phase diagrams for the Ag-Ge(111) and Au-Si(111) systems. Surf Sci. 2000;461(1-3):23-30.
97. Bengu E, Marks LD. Single-walled BN nanostructures. Phys Rev Lett. 2001;86(11):2385-7.
98. Widjaja EJ, Marks LD. In situ studies of magnetron sputtered Al-Cu-Fe-Cr quasicrystalline thin films. Thin Solid Films. 2002;420:295-9.
99. Widjaja EJ, Marks LD. Epitaxial decagonal thin films on crystalline substrates. Philos Mag Lett. 2003;83(1):47-55.
100. Widjaja EJ, Marks LD. Coincidence of reciprocal lattice planes model for quasicrystal-crystal epitaxy. Phys Rev B. 2003;68(13):134211.
101. Widjaja EJ, Marks LD. Microstructural evolution in Al-Cu-Fe quasicrystalline thin films. Thin Solid Films. 2003;441(1-2):63-71.
102. Bengu E, Marks LD, Ovali RV, Gulseren O, editors. Analysis of defects on BN nano-structures using high-resolution electron microscopy and density-functional calculations. 11th Conference on Frontiers of Electron Microscopy in Materials Science; 2007 Sep 24-28; Sonoma, CA.
103. Bengu E, Marks LD, Ovali RV, Gulseren O. Analysis of defects on BN nano-structures using high-resolution electron microscopy and density-functional calculations. Ultramicroscopy. 2008;108(11):1484-9.
104. Widjaja EJ, Marks LD. Models for quasicrystal-crystal epitaxy. J Phys-Condes Matter. 2008;20(31):314003.
105. Gilmore CJ, Marks LD, Grozea D, Collazo C, Landree E, Twesten RD. Direct solutions of the Si(111) 7x7 structure. Surf Sci. 1997;381(2-3):77-91.
106. Landree E, Collazo-Davila C, Marks LD. Multi-solution genetic algorithm approach to surface structure determination using direct methods. Acta Crystallogr Sect B-Struct Sci. 1997;53:916-22.
107. Marks LD, Plass R, Dorset D. Imaging surface structures by direct phasing. Surf Rev Lett. 1997;4(1):1-8.
108. Grozea D, Landree E, Marks LD, Feidenhans'l R, Nielsen M, Johnson RL. Direct methods determination of the Si(111)-(6x6)Au surface structure. Surf Sci. 1998;418(1):32-45.
109. Marks LD, Bengu E, Collazo-Davila C, Grozea D, Landree E, Leslie C, Sinkler W. Direct methods for surfaces. Surf Rev Lett. 1998;5(5):1087-106.
110. Leslie C, Landree E, Collazo-Davila C, Bengu E, Grozea D, Marks LD. Electron crystallography in surface structure analysis. Microsc Res Tech. 1999;46(3):160-77.
111. Marks LD, Erdman N, Subramanian A. Crystallographic direct methods for surfaces. J Phys-Condes Matter. 2001;13(47):10677-87.
112. Marks LD. General solution for three-dimensional surface structures using direct methods. Phys Rev B. 1999;60(4):2771-80.
113. Collazo-Davila C, Grozea D, Marks LD, Feidenhans'l R, Nielsen M, Seehofer L, Lottermoser L, Falkenberg G, Johnson RL, Gothelid M, Karlsson U. Solution of Ge(111)-(4x4)-Ag structure using direct methods applied to X-ray diffraction data. Surf Sci. 1998;418(2):395-406.
114. Marks LD, Grozea D, Feidenhans'L R, Nielsen M, Johnson RL. Au 6x6 on Si(111): Evidence for a 2D pseudoglass. Surf Rev Lett. 1998;5(2):459-64.
115. Kumpf C, Marks LD, Ellis D, Smilgies D, Landemark E, Nielsen M, Feidenhans R, Zegenhagen J, Bunk O, Zeysing JH, Su Y, Johnson RL. Subsurface dimerization in III-V semiconductor (001) surfaces. Phys Rev Lett. 2001;86(16):3586-9.
116. Kumpf C, Smilgies D, Landemark E, Nielsen M, Feidenhans'l R, Bunk O, Zeysing JH, Su Y, Johnson RL, Cao L, Zegenhagen J, Fimland BO, Marks LD, Ellis D. Structure of metal-rich (001) surfaces of III-V compound semiconductors. Phys Rev B. 2001;6407(7):art. no.-075307.

117. Marks LD, Sinkler W, Landree E. A feasible set approach to the crystallographic phase problem. Acta Crystallogr Sect A. 1999;55(Pt 4):601-12.

118. Sinkler W, Bengu E, Marks LD. Application of Direct Methods to Dynamical Electron Diffraction Data for Solving Bulk Crystal Structures. Acta Crystallographica Section A Foundations of Crystallography. 1998;54(5):591-605.

119. Sinkler W, Marks LD. Application of Direct Methods for Crystal Structure Determination Using Strongly Dynamical Bulk Electron Diffraction. Mater Charact. 1999;42(4-5):283-95.

120. Sinkler W, Marks LD. Dynamical direct methods for everyone. Ultramicroscopy. 1999;75(4):251-68.

121. Marks LD, Sinkler W. Sufficient conditions for direct methods with swift electrons. Microsc microanal. 2003;9(5):399-410.

122. Own CS, Marks LD, Sinkler W. Electron precession: A guide for implementation. Rev Sci Instrum. 2005;76(3):033703.

123. Own CS, Marks LD, Sinkler W. Precession electron diffraction 1: multislice simulation. Acta Crystallogr Sect A. 2006;62(Pt 6):434-43.

124. Own CS, Sinkler W, Marks LD. Prospects for aberration corrected electron precession. Ultramicroscopy. 2007;107(6-7):534-42.

125. Sinkler W, Own CS, Marks LD. Application of a 2-beam model for improving the structure factors from precession electron diffraction intensities. Ultramicroscopy. 2007;107(6-7):543-50.

126. Ciston J, Deng B, Marks LD, Own CS, Sinkler W. A quantitative analysis of the cone-angle dependence in precession electron diffraction. Ultramicroscopy. 2008;108(6):514-22.

127. Sinkler W, Marks LD. Characteristics of precession electron diffraction intensities from dynamical simulations. Zeitschrift Fur Kristallographie. 2010;225(2-3):47-55.

128. Palatinus L, Jacob D, Cuvillier P, Klementova M, Sinkler W, Marks LD. Structure refinement from precession electron diffraction data. Acta crystallographica Section A, Foundations of crystallography. 2013;69(Pt 2):171-88.

129. Own CS, Subramanian AK, Marks LD. Quantitative analyses of precession diffraction data for a large cell oxide. Microsc microanal. 2004;10(1):96-104.

130. Ciston J, Own CS, Marks LD. Cone-angle dependence of ab-initio structure solutions using precession electron diffraction. Electron Microscopy and Multiscale Modeling, Proceedings. 2008;999:53-+.

131. Liao YF, Marks LD. On the alignment for precession electron diffraction. Ultramicroscopy. 2012;117:1-6.

132. Liao Y, Marks LD. Reduction of Electron Channeling in EDS using Precession. Ultramicroscopy. 2013;126:19-22.

133. Erdman N, Poeppelmeier KR, Asta M, Warschkow O, Ellis DE, Marks LD. The structure and chemistry of the TiO_2-rich surface of $SrTiO_3$ (001). Nature. 2002;419(6902):55-8.

134. Erdman N, Marks LD. $SrTiO_3$ (001) surface structures under oxidizing conditions. Surf Sci. 2003;526(1-2):107-14.

135. Erdman N, Warschkow O, Asta M, Poeppelmeier KR, Ellis DE, Marks LD. Surface structures of $SrTiO_3$ (001): A TiO2-rich reconstruction with a c(4 x 2) unit cell. J Am Chem Soc. 2003;125(33):10050-6.

136. Warschkow O, Asta M, Erdman N, Poeppelmeier KR, Ellis DE, Marks LD. TiO_2-rich reconstructions of $SrTiO_3$ (001): a theoretical study of structural patterns. Surf Sci. 2004;573(3):446-56.

137. Lanier CH, Rondinelli JM, Deng B, Kilaas R, Poeppelmeier KR, Marks LD. Surface reconstruction with a fractional hole: (root 5x root 5)R26.6 degrees $LaAlO_3$(001). Phys Rev Lett. 2007;98(8):086102.

138. Lanier CH, van de Walle A, Erdman N, Landree E, Warschkow O, Kazimirov A, Poeppelmeier KR, Zegenhagen J, Asta M, Marks LD. Atomic-scale structure of the $SrTiO_3$(001)-c(6x2) reconstruction: Experiments and first-principles calculations. Phys Rev B. 2007;76(4):045421.

139. Wang YM, Warschkow O, Marks LD. Surface evolution of rutile TiO_2 (100) in an oxidizing environment. Surf Sci. 2007;601(1):63-7.

140. Ciston J, Subramanian A, Marks LD. Water-driven structural evolution of the polar MgO (111) surface: An integrated experimental and theoretical approach. Phys Rev B. 2009;79(8):085421.

141. Lanier CH, Chiaramonti AN, Marks LD, Poeppelmeier KR. The Fe3O4 origin of the "Biphase" reconstruction on alpha-Fe2O3(0001). Surf Sci. 2009;603(16):2574-9.

142. Marks LD, Chiaramonti AN, Tran F, Blaha P. The small unit cell reconstructions of SrTiO3(111). Surf Sci. 2009;603(14):2179-87.

143. Becerra-Toledo AE, Marks LD. Strontium oxide segregation at SrLaAlO4 surfaces. Surf Sci. 2010;604(17-18):1476-80.

144. Ciston J, Subramanian A, Kienzle DM, Marks LD. Why the case for clean surfaces does not hold water: Structure and morphology of hydroxylated nickel oxide (111). Surf Sci. 2010;604(2):155-64.

145. Enterkin JA, Subramanian AK, Russell BC, Castell MR, Poeppelmeier KR, Marks LD. A homologous series of structures on the surface of $SrTiO_3$(110). Nature Materials. 2010;9(3):245-8.

146. Kienzle DM, Becerra-Toledo AE, Marks LD. Vacant-Site Octahedral Tilings on SrTiO3 (001), the (root 13 x root 13)R33.7 degrees Surface, and Related Structures. Phys Rev Lett. 2011;106(17):176102.

147. Lin Y, Becerra-Toledo AE, Silly F, Poeppelmeier KR, Castell MR, Marks LD. The (2×2) reconstructions on the SrTiO3 (001) surface: A combined scanning tunneling microscopy and density functional theory study. Surf Sci. 2011;605(17-18):L51-L5.

148. Marshall MSJ, Becerra-Toledo AE, Marks LD, Castell MR. Surface and Defect Structure of Oxide Nanowires on SrTiO(3). Phys Rev Lett. 2011;107(8):086102.

149. Becerra-Toledo AE, Castell MR, Marks LD. Water adsorption on $SrTiO_3$(001): I. Experimental and simulated STM. Surf Sci. 2012;606(7-8):762-5.

150. Becerra-Toledo AE, Enterkin JA, Kienzle DM, Marks LD. Water adsorption on $SrTiO_3$(001): II. Water, water, everywhere. Surf Sci. 2012;606(9-10):791-802.

151. Enterkin JA, Becerra-Toledo AE, Poeppelmeier KR, Marks LD. A chemical approach to understanding oxide surfaces. Surf Sci. 2012;606(3-4):344-55.

152. Kienzle DM, Marks LD. Surface transmission electron diffraction for $SrTiO_3$ surfaces. CrystEngComm. 2012;14(23):7833-9.

153. Marshall MSJ, Becerra-Toledo A, Payne DJ, Edgell RG, Marks LD, Castell MR. Structure and composition of linear TiO_x nanostructures on $SrTiO_3$ (001) surfaces. Phys Rev B. 2012;86:125416.

154. Lin Y, Wen J, Hu L, Kennedy RM, Stair PC, Poeppelmeier KR, Marks LD. Synthesis-dependent atomic surface structures of oxide nanoparticles. Phys Rev Lett. 2013;111(15):156101.

155. Lin Y, Wen J, Hu L, McCarthy JA, Wang S, Poeppelmeier KR, Marks LD. Electron-Induced Ti-rich Surface Segregation on $SrTiO_3$ Nanoparticles. Micron. 2014.

156. Lin Y, Wu Z, Wen J, Poeppelmeier KR, Marks LD. Imaging the Atomic Surface Structures of CeO_2 Nanoparticles. Nano Letters. 2014;14(1):191-6.

157. Ciston J, Brown HG, D'Alfonso AJ, Koirala P, Ophus C, Lin Y, Suzuki Y, Inada H, Zhu Y, Allen LJ, Marks LD. Surface determination through atomically resolved secondary-electron imaging. Nat Commun. 2015;6:7358.

158. Crosby L, Enterkin J, Rabuffetti F, Poeppelmeier K, Marks LD. Wulff shape of strontium titanate nanocuboids. Surf Sci. 2015;632:L22-L5.

159. Kienzle D, Koirala P, Marks LD. Lanthanum aluminate (110) 3 x 1 surface reconstruction. Surf Sci. 2015;633:60-7.

160. Lin Y, Wen J, Hu L, McCarthy JA, Wang S, Poeppelmeier KR, Marks LD. Electron-induced Ti-rich surface segregation on SrTiO3 nanoparticles. Micron. 2015;68:152-7.

161. Marks LD, Chiaramonti AN, Rahman SU, Castell MR. Transition from Order to Configurational Disorder for Surface Reconstructions on SrTiO_{3}(111). Phys Rev Lett. 2015;114(22):226101.

162. Marshall MJ, Becerra-Toledo A, Marks L, Castell M. Defects on Strontium Titanate. In: Jupille J, Thornton G, editors. Defects at Oxide Surfaces. Springer Series in Surface Sciences. 58: Springer International Publishing; 2015. p. 327-49.

163. Andersen TK, Fong DD, Marks LD. Pauling's rules for oxide surfaces. Surface Science Reports. 2018;73(5):213-32.

164. Camden JP, Dieringer JA, Wang YM, Masiello DJ, Marks LD, Schatz GC, Van Duyne RP. Probing the structure of single-molecule surface-enhanced Raman scattering hot spots. J Am Chem Soc. 2008;130(38):12616-+.

165. McMahon JA, Wang YM, Sherry LJ, Van Duyne RP, Marks LD, Gray SK, Schatz GC. Correlating the Structure, Optical Spectra, and Electrodynamics of Single Silver Nanocubes. Journal of Physical Chemistry C. 2009;113(7):2731-5.

166. Wang Y, Eswaramoorthy SK, Sherry LJ, Dieringer JA, Camden JP, Schatz GC, Van Duyne RP, Marks LD. A method to correlate optical properties and structures of metallic nanoparticles. Ultramicroscopy. 2009;109(9):1110-3.

167. Ringe E, McMahon JM, Sohn K, Cobley C, Xia YN, Huang JX, Schatz GC, Marks LD, Van Duyne RP. Unraveling the Effects of Size, Composition, and Substrate on the Localized Surface Plasmon Resonance Frequencies of Gold and Silver Nanocubes: A Systematic Single-Particle Approach. Journal of Physical Chemistry C. 2010;114(29):12511-6.

168. Henry AI, Bingham JM, Ringe E, Marks LD, Schatz GC, Van Duyne RP. Correlated Structure and Optical Property Studies of Plasmonic Nanoparticles. Journal of Physical Chemistry C. 2011;115(19):9291-305.

169. Grubisic A, Ringe E, Cobley CM, Xia YN, Marks LD, Van Duyne RP, Nesbitt DJ. Plasmonic Near-Electric Field Enhancement Effects in Ultrafast Photoelectron Emission: Correlated Spatial and Laser Polarization Microscopy Studies of Individual Ag Nanocubes. Nano Letters. 2012;12(9):4823-9.

170. Ringe E, Langille MR, Sohn K, Zhang J, Huang JX, Mirkin CA, Van Duyne RP, Marks LD. Plasmon Length: A Universal Parameter to Describe Size Effects in Gold Nanoparticles. Journal of Physical Chemistry Letters. 2012;3(11):1479-83.

171. Ringe E, Zhang J, Langille MR, Mirkin CA, Marks LD, Van Duyne RP. Correlating the structure and localized surface plasmon resonance of single silver right bipyramids. Nanotechnology. 2012;23(44):444005.

172. Ringe E, Sharma B, Henry AI, Marks LD, Van Duyne RP. Single nanoparticle plasmonics. Physical Chemistry Chemical Physics. 2013;15(12):4110-29.

173. Ringe E, Van Duyne RP, Marks LD. Correlated structure-optical properties studies of plasmonic nanoparticles. Journal of Physics: Conference Series. 2014;522(1):12006-11.

174. Merkle AP, Marks LD. Friction in full view. Appl Phys Lett. 2007;90(6):064101.

175. Marks LD, Warren OL, Minor AM, Merkle AP. Tribology in Full View. MRS Bulletin. 2008;33(12):1168-73.

176. Merkle AP, Marks LD. Liquid-like tribology of gold studied by in situ TEM. Wear. 2008;265(11-12):1864-9.

177. Liao Y, EswaraMoorthy SK, Marks LD. Direct observation of tribological recrystallization. Philos Mag Lett. 2010;90(3):219-23.

178. Merkle AP, Erdemir A, Eryilmaz OL, Johnson JA, Marks LD. In situ TEM studies of tribo-induced bonding modifications in near-frictionless carbon films. Carbon. 2010;48(3):587-91.

179. M'Ndange-Pfupfu A, Eryilmaz O, Erdemir A, Marks LD. Quantification of sliding-induced phase transformation in N3FC diamond-like carbon films. Diam Relat Mat. 2011;20(8):1143-8.

180. Casillas G, Liao Y, Jose-Yacaman M, Marks LD. Monolayer Transfer Layers During Sliding at the Atomic Scale. Tribology Letters. 2015;59(3):45.

181. Liao YF, Hoffman E, Marks LD. Nanoscale Abrasive Wear of CoCrMo in In Situ TEM Sliding. Tribology Letters. 2015;57(3):28.

182. Merkle AP, Marks LD. A predictive analytical friction model from basic theories of interfaces, contacts and dislocations. Tribology Letters. 2007;26(1):73-84.

183. Merkle AP, Marks LD. Comment on "friction between incommensurate crystals''. Philos Mag Lett. 2007;87(8):527-32.

184. Liao Y, Marks LD. Modeling of Thermal-Assisted Dislocation Friction. Tribology Letters. 2010;37(2):283-8.

185. M'Ndange-Pfupfu A, Marks LD. A Dislocation-Based Analytical Model for the Nanoscale Processes of Shear and Plowing Friction. Tribology Letters. 2010;39(2):163-7.

186. M'ndange-Pfupfu A, Marks LD. Modeling of Phonon Wind Shielding Effects on Moving Dislocation Arrays. Tribology Letters. 2012;47(3):431-4.

187. Mondal P, Shah SP, Marks LD. A reliable technique to determine the local mechanical properties at the nanoscale for cementitious materials. Cement and Concrete Research. 2007;37(10):1440-4.

188. Mondal P, Shah SR, Marks LD. Nanoscale characterization of cementitious materials. ACI Materials Journal. 2008;105(2):174-9.

189. Mondal P, Shah SP, Marks LD, Gaitero JJ. Comparative Study of the Effects of Microsilica and Nanosilica in Concrete. Transportation Research Record. 2010(2141):6-9.

190. Marks LD, Luke DR. Robust mixing for ab initio quantum mechanical calculations. Physical Review B (Condensed Matter and Materials Physics). 2008;78(7):075114-12.

191. Marks LD. Fixed-Point Optimization of Atoms and Density in DFT. Journal of Chemical Theory and Computation. 2013;9(6):2786-800.

192. Blaha P, Schwarz K, Madsen GKH, Kvasnicka D, Luitz J, Laskowsji R, Tran F, Marks LD. An Augmented Plane Wave + Local Orbitals Program for Calculating Crystal Properties. Techn. Universitat Wien, Austria2018.

193. Liao Y, Pourzal R, Wimmer MA, Jacobs JJ, Fischer A, Marks LD. Graphitic Tribological Layers in Metal-on-Metal Hip Replacements. Science. 2011;334(6063):1687-90.

194. Liao Y, Pourzal R, Stemmer P, Wimmer MA, Jacobs JJ, Fischer A, Marks LD. New insights into hard phases of CoCrMo metal-on-metal hip replacements. Journal of the Mechanical Behavior of Biomedical Materials. 2012;12:39-49.

195. Hoffman E, Liao Y, Marks LD. Towards Understanding Tribocorrosion in Hip Replacements. Microsc microanal. 2013;19:176-7.

196. Liao Y, Hoffman E, Wimmer M, Fischer A, Jacobs J, Marks LD. CoCrMo metal-on-metal hip replacements. Phys Chem Chem Phys. 2013;15(3):746-56.

197. Panigrahi P, Liao Y, Mathew M, Wimmer MA, Jacobs JJ, Marks LD. Intergranular pitting corrosion of CoCrMo biomedical implant alloy. Journal of Biomedical Research. 2013;DOI: 10.1002/jbm.b.33067(4):850-9.

198. Stemmer P, Pourzal R, Liao Y, Marks LD, Morlock M, Jacobs JJ, Wimmer MA, Fischer A. Microstructure of Retrievals made from Standard Cast HC-CoCrMo Alloys. ASTM – Selected Technical Papers. 2013;DOI:10.1520/STP156020120033:251-67.

199. Wimmer MA, Mathew MT, Laurent MP, Nagelli C, Liao Y, Marks LD, Pourzal R, Fischer A, Jacobs JJ. Tribochemical Reactions in Metal-on-Metal Hip Joints Influence Wear and Corrosion. ASTM – Selected Technical Papers. 2013;DOI:10.1520/STP156020120050:292-309.

200. Panigrahi P, Liao Y, Mathew MT, Fischer A, Wimmer MA, Jacobs JJ, Marks LD. Intergranular pitting corrosion of CoCrMo biomedical implant alloy. Journal of biomedical materials research Part B, Applied biomaterials. 2014;102(4):850-9.

201. Wimmer MA, Laurent MP, Mathew MT, Nagelli C, Liao Y, Marks LD, Jacobs JJ, Fischer A. The effect of contact load on CoCrMo wear and the formation and retention of tribofilms. Wear. 2015;332-333(0):643-9.

202. Hoffman EE, Lin A, Liao YF, Marks LD. Grain Boundary Assisted Crevice Corrosion in CoCrMo Alloys. Corrosion. 2016;72(11):1445-61.

203. Lin A, Hoffman EE, Marks LD. Effects of Grain Boundary Misorientation and Chromium Segregation on Corrosion of CoCrMo Alloys. Corrosion. 2016;73(3):256-67.

204. Haes AJ, Zhao J, Zou SL, Own CS, Marks LD, Schatz GC, Van Duyne RP. Solution-phase, triangular Ag nanotriangles fabricated by nanosphere lithography. Journal of Physical Chemistry B. 2005;109(22):11158-62.

205. Rabuffetti FA, Kim HS, Enterkin JA, Wang YM, Lanier CH, Marks LD, Poeppelmeier KR, Stair PC. Synthesis-dependent first-order Raman scattering in $SrTiO_3$ nanocubes at room temperature. Chem Mat. 2008;20(17):5628-35.

206. Enterkin JA, Poeppelmeier KR, Marks LD. Oriented Catalytic Platinum Nanoparticles on High Surface Area Strontium Titanate Nanocuboids. Nano Letters. 2011;11(3):993-7.

207. Enterkin JA, Setthapun W, Elam JW, Christensen ST, Rabuffetti FA, Marks LD, Stair PC, Poeppelmeier KR, Marshall CL. Propane Oxidation over Pt/SrTiO3 Nanocuboids. Acs Catalysis. 2011;1(6):629-35.

208. Ringe E, Van Duyne RP, Marks LD. Wulff Construction for Alloy Nanoparticles. Nano Letters. 2011;11(8):3399-403.

209. Chen C-C, Zhu C, White ER, Chiu C-Y, Scott MC, Regan BC, Marks LD, Huang Y, Miao J. Three-dimensional imaging of dislocations in a nanoparticle at atomic resolution. Nature. 2013;496(7443):74-7.

210. Enterkin J, Kennedy R, Lu J, Elam J, Cook R, Marks L, Stair P, Marshall C, Poeppelmeier K. Epitaxial Stabilization of Face Selective Catalysts. Top Catal. 2013;56(18-20):1-6.

211. Patala S, Marks LD, Olvera de la Cruz M. Thermodynamic Analysis of Multiply Twinned Particles: Surface Stress Effects. The Journal of Physical Chemistry Letters. 2013;4(18):3089-94.

212. Ringe E, Van Duyne RP, Marks LD. Kinetic and Thermodynamic Modified Wulff Constructions for Twinned Nanoparticles. Journal of Physical Chemistry C. 2013;117(31):15859-70.

213. Patala S, Marks LD, de la Cruz MO. Elastic Strain Energy Effects in Faceted Decahedral Nanoparticles. Journal of Physical Chemistry C. 2013;117(3):1485-94.

214. Shin YJ, Ringe E, Personick ML, Cardinal MF, Mirkin CA, Marks LD, Van Duyne RP, Hersam MC. Centrifugal Shape Sorting and Optical Response of Polyhedral Gold Nanoparticles. Advanced Materials. 2013;25(29):4023-7.

215. Johnson AM, Quezada BR, Marks LD, Stair PC. Influence of the Metal Oxide Substrate Structure on Vanadium Oxide Monomer Formation. Top Catal. 2014;57(1-4):177-87.

216. Masango SS, Peng LX, Marks LD, Van Duyne RP, Stair PC. Nucleation and Growth of Silver Nanoparticles by AB and ABC-Type Atomic Layer Deposition. Journal of Physical Chemistry C. 2014;118(31):17655-61.

217. Wang H, Lu JL, Marshall CL, Elam JW, Miller JT, Liu HB, Enterkin JA, Kennedy RM, Stair PC, Poeppelmeier KR, Marks LD. In situ XANES study of methanol decomposition and partial oxidation to syn-gas over supported Pt catalyst on SrTiO3 nanocubes. Catalysis Today. 2014;237:71-9.

218. Alpay D, Peng L, Marks LD. Corner-rounding of nanoparticles. Journal of Physical Chemistry C. 2015;In Press.

219. Lin Y, Wu Z, Wen J, Ding K, Yang X, Poeppelmeier KR, Marks LD. Adhesion and Atomic Structures of Gold on Ceria Nanostructures: The Role of Surface Structure and Oxidation State of Ceria Supports. Nano Lett. 2015;15(8):5375-81.

220. Peng L, Ringe E, Van Duyne RP, Marks LD. Segregation in bimetallic nanoparticles. Phys Chem Chem Phys. 2015;17(42):27940-51.

221. Peng L, Van Duyne RP, Marks LD. Strain-Induced Segregation in Bimetallic Multiply Twinned Particles. J Phys Chem Lett. 2015;6(10):1930-4.
222. Wang C, Hu L, Poeppelmeier KR, Stair PC, Marks LD. Nucleation and Growth Process of Atomic Layer Deposition Platinum Nanoparticles on Strontium Titanate Nanocuboids. Submitted. 2015.
223. Ding K, Gulec, A., Johnson AM, Wu W, Schweitzer NM, Weitz E, Stucky GD, Marks LD, Stair PC. Identification of active sites in CO oxidation and water-gas shift over supported Pt catalysts. Science. 2015;In Press.
224. Chen B-R, George C, Lin Y, Hu L, Crosby L, Hu X, Stair PC, Marks LD, Poeppelmeier KR, Van Duyne RP, Bedzyk MJ. Morphology and oxidation state of ALD-grown Pd nanoparticles on TiO 2 - and SrO-terminated SrTiO 3 nanocuboids. Surf Sci. 2016;648:291-8.
225. Ding KL, Gulec A, Johnson AM, Drake TL, Wu WQ, Lin YY, Weitz E, Marks LD, Stair PC. Highly Efficient Activation, Regeneration, and Active Site Identification of Oxide-Based Olefin Metathesis Catalysts. Acs Catalysis. 2016;6(9):5740-6.
226. Marks LD, Peng L. Nanoparticle shape, thermodynamics and kinetics. J Phys Condens Matter. 2016;28(5):053001.
227. Crosby LA, Chen BR, Kennedy RM, Wen JG, Poeppelmeier KR, Bedzyk MJ, Marks LD. All Roads Lead to TiO2: TiO2-Rich Surfaces of Barium and Strontium Titanate Prepared by Hydrothermal Synthesis. Chem Mat. 2018;30(3):841-6.
228. Ly T, Wen J, Marks LD. Kinetic Growth Regimes of Hydrothermally Synthesized Potassium Tantalate Nanoparticles. Nano Lett. 2018;18(8):5186-91.
229. Yu XX, Gulec A, Yoon A, Zuo JM, Voorhees PW, Marks LD. Direct Observation of "Pac-Man" Coarsening. Nano Lett. 2017;17(8):4661-4.
230. Gulec A, Yu XX, Taylor M, Yoon A, Zuo JM, Perepezko JH, Marks LD. Early Stage of Oxidation of Mo3Si by In Situ Environmental Transmission Electron Microscopy. Corrosion. 2018;74(3):288-94.
231. Yu XX, Gulec A, Andolina CM, Zeitchick EJ, Gusieva K, Yang JC, Scully JR, Perepezko JH, Marks LD. In Situ Observations of Early Stage Oxidation of Ni-Cr and Ni-Cr-Mo Alloys. Corrosion. 2018;74(9):939-46.
232. Marks LD. Competitive Chloride Chemisorption Disrupts Hydrogen Bonding Networks: DFT, Crystallography, Thermodynamics, and Morphological Consequences. Corrosion. 2018;74(3):295-311.
233. Yu X-x, Marks LD. Combining the Physics of Metal/Oxide Heterostructure, Interface Dipole, Band Bending, Crystallography, and Surface State to Understand Heterogeneity Contrast in Oxidation and Corrosion. Corrosion. 2018;75(2):152-66.
234. Yu XX, Gulec A, Sherman Q, Cwalina KL, Scully JR, Perepezko JH, Voorhees PW, Marks LD. Nonequilibrium Solute Capture in Passivating Oxide Films. Phys Rev Lett. 2018;121(14):145701.
235. Koirala P, Mizzi CA, Marks LD. Direct Observation of Large Flexoelectric Bending at the Nanoscale in Lanthanide Scandates. Nano Lett. 2018;18(6):3850-6.
236. Mizzi CA, Koirala P, Marks LD. Electronic structure of lanthanide scandates. Physical Review Materials. 2018;2(2):025001.
237. Mizzi CA, Koirala P, Gulec A, Marks LD. Charging ain't all bad: Complex physics in DyScO3. Ultramicroscopy. 2019;203:119-24.
238. Mizzi CA, Lin AYW, Marks LD. Does Flexoelectricity Drive Triboelectricity? Phys Rev Lett. 2019;123(11).