

CURRICULUM VITAE: Laurence Daniel MARKS

Date of Birth: 4 July 1954

Education: 1973-1976 University of Cambridge, B.A. 1976
1976-1980 Research student at the Cavendish Laboratory,
Cambridge
1980 Ph.D., University of Cambridge
Thesis entitled "The structure of small silver
particles"

Professional Career:

1980-1983 Post doctoral research assistant
Cavendish Laboratory (Dept. of Physics),
University of Cambridge
1983-1985 Post doctoral research assistant, Department of
Physics Arizona State University
March 1985 Assistant Professor
June 1986 Associate Professor
June 1992- Professor, Department of Materials, Science &
Engineering, Northwestern University

Email L-marks@northwestern.edu

Web www.numis.northwestern.edu

Google Scholar scholar.google.com/citations?user=zmHhI9gAAAAJ&hl=en

Citations 25,831 **H-Index** 67

Awards and Honors:

Visiting Fellow, Linacre College, Oxford, 2019
ICSOS Surface Structure Prize, 2017
Fellow, Microscopy Society of America, 2017
Astor Visiting Lecturer, University of Oxford, 2015
Warren Award, American Crystallographic Association, 2015
Fellow, American Physical Society, 2001
Burton Medal, Electron Microscopy Society of America, 1989
Sloan Foundation Fellowship 1987
Scholarship, Kings College, University of Cambridge 1976

Current Research Interests:

Electron Microscopy

Precession Electron Diffraction; Surface Imaging in an Electron Microscope; Dynamical
Diffraction; In-Situ Microscopy; Direct Methods for Bulk Materials; Charge Density
Measurements

Density Functional Theory

Mixing and Optimization Algorithms, Oxide Surfaces, Flexoelectric Effects

Oxide Surfaces

Structure, Kinetics and Energetics of Oxide Surfaces; Predictive Rules for Oxide Surfaces; Direct Methods with Electrons or X-rays; Corrosion

Tribology

The Role of Dislocations in Nanoscale Tribological Properties; In-Situ Tribology; Metal-on-Metal Hip Replacements

Nanoparticles

Role of structure and shape on surface plasmonics; nucleation and growth of nanoparticles; thermodynamics and Wulff constructions; Catalysis; Nanoplasmonics.

Corrosion

Understanding the early stages of corrosion, both high temperature oxidation and aqueous; Solute Trapping; Cabrera-Mott models; Morphological Instabilities

Flexoelectric Phenomena

Understanding the role of flexoelectric in a range of materials, including how it can be used for energy harvesting.

Main Current External Committees

IUCR, Program Committee

ICSOSS, Program Committee

Commission on Electron Crystallography of IUCR

Co-Editor, Acta Cryst A

US National Crystallography Committee

PhD Students

Ajayan, Pulichek (1989), *Phase instabilities in small particles.*

Ma, Yiquan (1990) *Dynamical theory for high energy electron reflection.*

Bonevich, John (1991), *Atomic structure and sintering behavior of ultrafine ceramic particles.*

Buckett, Mary (1991), *Electron radiation damage in transition metal oxides.*

Derren Dunn (1992) *Ultra high vacuum transmission electron microscopy of the clean surfaces of Au and Ir (001).*

Ai, Rebecca (1992), *Electron-induced surface radiation damage in V_2O_5 , ReO_3 and CaF_2 .*

Narayanaswamy, Dorai (1995) *Morphology transformations in nanoparticles.*

Jayaram, Ganesh (1995) *Ultrahigh vacuum transmission electron microscopy studies of semiconductor surfaces.*

Vuchic, Boris (1995) *The formation, transport properties and microstructure of 45° [001] tilt grain boundaries in $YBa_2Cu_3O_{7-x}$ thin films.*

Plass, Richard (1996) *Gold induced Si(111) surface reconstructions studied by ultrahigh vacuum transmission electron microscopy.*

Storey, Brad (1996) *Microstructure and composition of magnetic flux pinning defects in high-temperature superconductors.*

Collazo-Davila, Christopher (1998) *Initial stages of thin film deposition : metal-induced surface reconstruction on semiconductors and the nucleation of cubic boron nitride.*

Landree, Eric (1998) *Structural and chemical characterization of thin films and crystal surfaces.*

Bengu, Erman (2000) *Experimental and computational study of surfaces, interfaces and thin films.*

Grozea, Daniel (2000) *Initial growth of ultrathin metal films on semiconductors.*

Carmody, Michael (2000) *The local variation of the critical current along YBa₂Cu₃O_{7-x} grainboundary and ramp-edge Josephson junctions.*

Li, Quan (2001) *Nucleation and growth of metastable phases in thin films.*

Erdman, Natasha (2002), *Structure, morphology and chemistry of catalytic transition metal oxides.*

Edy Widjaja (2004) *Quasicrystalline thin films : growth, structure and interface.*

Arun Subramanian (2004) *Charge Density at Oxide Surfaces*

Ann Chiaramonti (2005) *Surfaces of Catalytically Relevant Oxides*

Chris Own (2005) *Precession Electron Diffraction*

Yingmin Wang (2006) *Catalysis by Gold Nanoparticles*

Arno Merkle (2006) *Nanotribology*

Courtney Lanier (2007) *Real and Model Oxide Surfaces*

Robin Koshy (2008) *Thermally Activated Self-lubricating Nanostructured Coating for Cutting Tool Applications*

Paramita Mondal (2008) *Nanoscale Properties and Mechanics of Cementitious Materials*

James Ciston (2009) *Crystallographic perturbations to valence charge density and hydrogen-surface interactions*

James Enterkin (2010) *A Chemical Approach to Understanding Oxide Surface Structure and Reactivity*

Brian Quezada (2010) *Strontium Titanate Surfaces*

Andres E. Becerra-Toledo (2011) *Surface Stabilization Mechanisms in Metal Oxides*

Emilie Ringe (2012) *Building the Nanoplasmonics Toolbox Through Shape Modeling and Single Particle Optical Studies*

M'ndange-Pfupfu, Ariel (2012) *Structural and Chemical Investigations of Nanotribology Using In Situ Transmission Electron Microscopy and Defect Based Analytical Modeling*

Danielle Kienzle (2013) *Surface Reconstructions of Oxides*

Yuyuan Lin (2014) *Atomic Surface Structures of Oxide Materials: From Single Crystals to Nanoparticles*

Chuandao Wang (2014) *Atomically-Precise Synthesis of Platinum Catalysts on Strontium Titanate using Atomic Layer Deposition*

Emily Hoffman (2017) *Tribology and Corrosion in CoCrMo Alloys and Similar Systems*

Betty Peng (2017) *Shape, Thermodynamics, Kinetics and Growth Mechanisms of Metal and Bimetallic Nanoparticles*

Pratik Koirala (2017) *Oxide Surfaces and Flexoelectric Effects*

Tassie Andersen (2018) *Understanding Atomic Structure and Structural Evolution of Perovskite Oxides at the 2-D Limit: From Surface to Thin Film*

Say Cook (2018) *Defect Induced Behavior in Complex Oxides*

Lawrence Crosby (2018) *Synthesis, Shape, and Surfaces of Strontium and Barium Titanate Nanocrystals*

Current PhD Students

Tiffany Ly	Oxide Nanoparticles and Surfaces
Chris Mizzi	Oxide Surfaces and Flexoelectric Effects
Ryan Paull	Oxide Nanoparticle Catalysis (with K. R. Poeppelmeier)
Zachary Mansley	Oxide Nanoparticle Catalysis
Alex Lin	Tribology and Corrosion

Current Postdoctoral Scientist

Xiao-xiang Yu	Corrosion, Experimental and Theoretical
Edmund Long	Corrosion, Experimental and Theoretical

Postdoctoral or Visiting Scientists to date (Chronological)

D. E. Luzzi, J. P. Zhang, H. Shibahara, J. Singh, H. J. Fan, D. J. Li, H. Zhang, P. Xu, V. A. Volpert, W. Sinkler, C. Leslie, J. J. Hu, F. N. Chukhovskii, R. Kilaas, B. Deng, Y. Wang, S. Eswara Moorth, Y. Liao, H. Amari), Victor Zenou (Ben-Gurion University of the Negev), Yifeng Liao (Dow Chemical), Ahmet Gulec

Recent Collaborators

M. Asta (UCD), S Barnett (NU), P Blaha (Vienna), O. Bunk (ESRF), M Castell (Oxford), F.-R. Chen (Taiwan), Y. W Chung (NU), J. Ciston (LBNL), U. Diebold (TU-Wien), R. Van Duyne (NU), D. van Dyke (Antwerp), D. Ellis (NU), A. Erdimir (ANL), R. Feidenhans'l (Copenhagen), A. Fischer (Essen), J. Jacobs (Rush), A Kirkland (Oxford), H. Kung (NU), T. Marks (NU), R. Luke (Delaware), M. Olvera (NU), J. Perepezko (Madison), K. Poeppelmeier (NU), P. Reinke (Virginia), E. Ringe (Rice), I. K. Robinson (UCL), J. Rondinelli (NU), J. Scully (Virginia), G. Schatz (NU), S. Shah (NU), K. Shull (NU), W. Sinkler (UOP), P. C. Stair (NU), N. Tanaka (Nagoya), K. Tsuda (Tohoku), P. Voorhees (NU), J. Wang (NU), O. Warschkow (Sydney), O. Warren (Hysitron), W Weitz (NU), M. Yacaman (UTSA), J. Zhegenghagen (ESRF)

Talks from 2000- (Invited only)

2000

UHV Electron Microscopy of Surfaces, 6th International Symposium on Inorganic Materials, Tokyo, Japan (3/2/00)

Growth of Single-Wall Boron Nitride Nanotubes & Nanostructures, 5th International Symposium on Advanced Physical Fields, Fabrication & Characterization of Atomic Scale Structures, Tsukuba, Japan (3/6/00 - 3/9/00)

Direct Methods of Imaging Surfaces, Workshop on Electron Holography and Other Direct Methods, Hong Kong (8/11/00-8/18/00)

Transportation Nanotechnology, Exxon Corporation, Clinton, NJ, December 2000

Nucleation and Growth of BN Nanostructures, Aerospace Corporation, Los Angeles, CA December 2000.

Direct Methods, LBL, Berkley, CA, December 2000.

2001

Feasible-Sets, and the General Phase Problem, Phase Problem for Non-Periodic Objects, Berkley, CA, May 2001.

Nucleation and Growth of Quasicrystalline Thin Films, AFOSR contractors meeting, Florida, July 2001.

Direct Methods for Surfaces, Annual Catalysis Center Meeting, Evanston, IL September, 2001.

2002

Direct Methods with Electrons, American Crystallographic Association, San Antonio, May 2002

In-Situ microscopy, NTEAM-11 workshop, Berkeley, June 2002

Charge Density at Surfaces, ICSOSS-9, Newcastle, Australia, June 2002

Feasible Sets, International Union of Crystallography, Zurich, July 2002

Electron Microscopy of Surfaces, International Conference on Electron Microscopy, Durban, South Africa, August 2002

The Scientist, the Immigrant and the Ombudsman, keynote lecture, United States Ombudsman Association Annual Meeting, October 2002

UHV Micrography of Surfaces, ICEM Conference, Durban, S. Africa, 9/02

2003

Transportation Nanotechnology, FWHA, Washington, DC, April 2003

Direct Methods with Electrons, Electron Crystallography School, Moscow, June 2003

2004

Direct Methods with Electrons, First NCEM Crystallography School, April 2004,
Charge Transfer at Oxide Surfaces, Electronic Materials Conference, Notre Dame, May 2004

Nanotribology and Quasicrystalline Interfaces, Irsee Conference, May 2004

Charge Density at Oxide Surfaces, Gordon Conference, July 2004

Oxide Surfaces, Gordon Research Conference, July 2004

Prospects for Aberration Corrected Precession Diffraction, TEAM Session, Savannah, Georgia, August 2004

Charge Transfer at an MgO Surface, Microscopy Society of American Annual Meeting, Savannah, Georgia, August 2004

Oxides: From Structure to Chemistry, University of Washington, August 2004

2005

Precession Electron Diffraction, Oxford, UK, January 2005

Imaging Surfaces with Electrons, McMaster, Canada, February 2005

Imaging Surfaces with Electrons, Champaign-Urbana, Midwest Microscopy Meeting, June 2005

Precession Electron Diffraction, ACA Meeting, Orlando, Florida, June 2005

Experimental Charge Densities at Surfaces, IUCR Meeting, Florence, Italy, August 2005

Surfaces, Finding the Atoms then Finding the Electrons, Nancy, France, August 2005

Dynamical Direct Methods ; Precession Electron Diffraction, Brussels, Belgium, September 2005, School on Electron Crystallography

2006

- Examining Surfaces at the Nanoscale*, Ankara, Turkey, May 2006
Electron Diffraction: Synergies, ELCRYST School on Electron Crystallography, Antwerp, August 2006
Charge, Glowing in the Dark, Chinese Microscopy Meeting, Shengyang, August 2006
Charge Glowing in the Dark, ICEM, Sapporo, Japan, August 2006
Precession Electron Diffraction, Pittsburg Diffraction Conference, October 2006
- 2007**
- What DFT Teaches Surfaces and Surfaces Teach DFT*, Wien2k School, Penn State Univ
Friction in Full View, Berkeley Nanomechanics meeting, July 2007
Charge Density at Surfaces, EMMM2007, Moscow, September 2007
Friction in Full View, Seattle, AVS, October 2007
Precession Electron Diffraction, IUCR Crystallography School, Taiwan, November 2007
- 2008**
- Oxide Surfaces*, Korea, February 2008
Friction in Full View, Argonne National Labs, May 2008
Robust Mixing for DFT, SIAM Conference, Philadelphia, May 2008
Friction in Full View, Tribology Gordon Conference, July 2008
Direct Methods for Surfaces, ICSOSS, Brazil, August 2008
Friction in Full View, Nagoya IUCR Satellite Meeting, September 2008
Oxide Surfaces, Lehigh University, September 2008
Friction in Full View, Sikkim Discussions, Sikkim, India, November 2008
- 2009**
- Friction in Full View*, Yale University, February 2009
Friction in Full View, Heraeus Seminar, Bad Honnef, Germany, March 2009
Oxide Surfaces, Spring MRS Meeting, April 2009
Oxide Surfaces, APS, Argonne National Labs, April 2009
Precession Electron Diffraction, Lille School, France, July 2009
Oxide Surfaces, EMC25, Istanbul, Turkey, August 2009
Friction in Full View, UTRC, September 2009
Quantitative Microscopy, AEM-NANOMAT'09, Saltillo, Mexico, September 2009
Friction in Full View, *ibid*
Oxide Surfaces, ETH Zurich, October 2009
Oxide Surfaces, UIC, November 2009
- 2010**
- Correlated TEM and Optical Surface Plasmon Measurements*, Rio de Janeiro, IMC-7, September 2010
Correlated TEM and Optical Surface Plasmon Measurements, Osaka, Japan, October 2010
Correlated TEM and Optical Surface Plasmon Measurements, Nagoya, Japan, October 2010
Oxide Surfaces, University of Wisconsin, Madison, September 2010
Tribology in Full View, McGill University, Canada, October 2010

- Tribology in Full View*, MP3 Workshop, Illinois, October 2010
- 2011**
- The Phase Problem in Electron Crystallography*, Erice School, Sicily, June 2011
Models for Precession Electron Diffraction, *ibid*
Mixing and Minimization, Wien2k School, Penn State, July 2011
Correlated TEM and Optical Surface Plasmon Measurements, EM50, Hyderabad, July 2011
Solving Structures from Diffraction Data, MSA, Nashville, August 2011
Direct Methods for Surfaces, IUCR Triannual Meeting, Madrid, September 2011
- 2012**
- Tribology in Full View*, Beijing, January 2012
Tribology in Full View, Korea, January 2012
Tribology of Carbons, Gordon Research Conference, June 2012
Nanoparticles: UTSA, 2012
Nanoparticles: From Wulff to Winterbottom and Beyond, MP0903, Brno, March 2012
Oxide Surfaces, Wien Technical University, March 2012
Nanoparticles: From Wulff to Winterbottom and Beyond, TOFA, September 2012
Oxide Surfaces, TMS, Pittsburg, October 2012
Nanoparticles: From Wulff to Winterbottom and Beyond, U. Colorado, November 2012
Nanotribology: NIST, November 2012
- 2013**
- Advanced Electron Microscopy*, UC Irvine, Jan 2013
Oxide Surfaces, ACS, New Orleans, April 2013
Tribology in Full View, 4th International Workshop on Remote Electron Microscopy and In Situ Studies, Portugal, May 2013
DFT Mixing, SIAM Conference, Philadelphia, June 2013
Tribology in Full View, Drexel University, June 2013
Hip Implants, Advances in scanning transmission electron microscopy, Tennessee, August 2013
Nanoplasmonics, EMAG, York, September 2013
Solving the Phase Problem, PICO 2013, October 2013
Friction in Full View, AVS 2013, Long Beach CA, November 2013
The Pandora's Box of Perovskite Surfaces, Argonne National Labs, November 2013
Nanoplasmonics & Nanotribology, Seagate, November 2013
Oxide Surfaces and Nanoparticles: from Atomic Surface Structure to Thermodynamically Stable Face Selective Catalysis, UCLA, November 2013
- 2014**
- Oxide Surfaces*, IMEC16, Haifa, Israel, February 2014
Friction in Full View, CIMTEC 2014, Montecatini Terme, Italy, June 2014
Nanoparticle Thermodynamics, Catalysis Gordon Conference, Colby-Sawyer College, June 2014
Three Lectures, MSA Preconference School on Diffraction, Hartford, August 2014

- From Wulff to Winterbottom and Beyond*, IUCR, Montreal, August 2014
Oxide Surfaces, YUCOMAT, Montenegro, October 2014
Electron Crystallography, International Symposium on Crystallography, Fortaleza, Brazil, October 2014
Advanced Electron Microscopies, Duisberg-Essen, Germany, November 2014
- 2015**
Nanoparticles and Nanoalloys, ISSC-20, Birmingham, March 2015
Oxide Surfaces, Opening the Pandora's Box for SrTiO₃, MPM-1, Hangzhou, China, May 2015
Surfaces and Growth In-Situ: From Structure to Designed Nanostructures, SINANO, Suzhou, China, May 2015
Electron Crystallography, Warren Award Lecture, Philadelphia, July 2015
New Tools for Surfaces, NIMS, Tsukuba, Japan, July 2015
New Tools for Surfaces, UniCat Meeting, Northwestern University, August 2015
Understanding Nanoparticles, Rice University, September 2015
Oxide Surfaces, MS&T October 2015
Astor Lectures, October 2015
Corrosion: rust with 21st century tools
Oxide surfaces: opening the Pandora's Box
Nanoparticles: from thermodynamics and shape to plasmonics and catalysis
Tribology in Full View, 2015 STLE Tribology Frontiers Conference
- 2016**
Tribology in Full View, Heraus Conference, March 2016
Nanoparticles, from Plasmonics to Catalysis, ASU, April 2016
Corrosion in 4D, June 2016
Oxide Surfaces, 4th International Workshop on Complex Oxides, June 2016
Advanced TEM of Surfaces, ICMAT, Brazil, November 2016
- 2017**
Unexpected Flexoelectric Effects in Rare Earth Scandates, Kolkata, Jan 2017
Rust with 21st Century Tools, IBTN Keynote Lecture, Feb 2017
Crystallography of Nanoparticles, ACA, April 2017
Pauling's Rules for Oxide Surfaces, ICSOSS, July 2017
Chloride in Corrosion, Yucomat, September 2017
Carbon, carbon everywhere, from catalysts to hip implants, AVS, Oct 2017
- 2018**
Understanding Atomic Scale Structure in Four Dimensions to Design and Control Corrosion Resistant Alloys, Northwestern/Tel Aviv Workshop, July 2018
Unexpected Flexoelectric Effects in Rare Earth Scandates, Belgrade, Aug 2018
Unexpected Flexoelectric Effects in Rare Earth Scandates, Moscow, Aug 2018
Simultaneous Structure and Composition: Nonequilibrium Solute Capture, UIUC, Dec 2018
- 2019**
Understanding the role of Chloride in Corrosion: DFT, TEM and Morphological Instabilities, Manchester University, April 2019
In-Situ TEM of Tribology, MRS 2019 Spring Meeting, April 2019

Understanding the role of Chloride in Corrosion: DFT, TEM and Morphological Instabilities, Cambridge University, May 2019

Flexoelectricity & Complex Physics in LnScO₃, PICO 2019, May 2019

NonEquilibrium Solute Capture in Oxidation and Corrosion, MMC2019, Manchester, July 2019

Oxide Surfaces, Sinano, Suzhuo, August 2019

Nanoparticle Synthesis and Crystal Growth -- Are They Different?, Sinano, Suzhou, August 2019

Surface And Growth Morphologies Of Solid Solution Nanoparticles, IMRC 2019, August 2019

Does Flexoelectricity Drive Triboelectricity?, Washington Univ, October 2019

Publications [1-250][251-387]

1. *Multiply-Twinned Particles in Silver Catalysts*. Marks, L.D. and A. Howie, Nature, 1979. **282**(5735), 196-198 <http://dx.doi.org/10.1038/282196a0>
2. Marks, L.D., *The structure of small silver particles*. 1980: University of Cambridge
3. *High-Resolution Studies of Small Particles of Gold and Silver .1. Multiply-Twinned Particles*. Marks, L.D. and D.J. Smith, Journal of Crystal Growth, 1981. **54**(3), 425-432 [http://dx.doi.org/10.1016/0022-0248\(81\)90494-2](http://dx.doi.org/10.1016/0022-0248(81)90494-2)
4. *High-Resolution Studies of Small Particles of Gold and Silver .2. Single-Crystals, Lamellar Twins and Polyparticles*. Smith, D.J. and L.D. Marks, Journal of Crystal Growth, 1981. **54**(3), 433-438 [http://dx.doi.org/10.1016/0022-0248\(81\)90495-4](http://dx.doi.org/10.1016/0022-0248(81)90495-4)
5. *Direct Lattice Imaging of Small Metal Particles*. Smith, D.J. and L.D. Marks, Philosophical Magazine a-Physics of Condensed Matter Structure Defects and Mechanical Properties, 1981. **44**(3), 735-740 <http://dx.doi.org/10.1080/01418618108236175>
6. *New Imaging Methods for Catalyst Particles*. Howie, A., L.D. Marks, and S.J. Pennycook, Ultramicroscopy, 1982. **8**(1-2), 163-174 [http://dx.doi.org/10.1016/0304-3991\(82\)90285-6](http://dx.doi.org/10.1016/0304-3991(82)90285-6)
7. *Observation of the Image Force for Fast Electrons near an Mgo Surface*. Marks, L.D., Solid State Communications, 1982. **43**(10), 727-729 [http://dx.doi.org/10.1016/0038-1098\(82\)90979-6](http://dx.doi.org/10.1016/0038-1098(82)90979-6)
8. *Direct Imaging of Carbon-Covered and Clean Gold (110) Surfaces*. Marks, L.D., Physical Review Letters, 1983. **51**(11), 1000-1002 <http://dx.doi.org/10.1103/PhysRevLett.51.1000>
9. *Modified Wulff Constructions for Twinned Particles*. Marks, L.D., Journal of Crystal Growth, 1983. **61**(3), 556-566 [http://dx.doi.org/10.1016/0022-0248\(83\)90184-7](http://dx.doi.org/10.1016/0022-0248(83)90184-7)
10. *HREM and STEM of Defects in Multiply-Twinned Particles*. Marks, L.D. and D.J. Smith, Journal of Microscopy, 1983. **130**(May), 249-261 <http://dx.doi.org/10.1111/j.1365-2818.1983.tb04222.x>
11. *Direct Surface Imaging in Small Metal Particles*. Marks, L.D. and D.J. Smith, Nature, 1983. **303**(5915), 316-317 <http://dx.doi.org/10.1038/303316a0>
12. *Elastic Strains and the Energy-Balance for Multiply Twinned Particles*. Howie, A. and L.D. Marks, Philosophical Magazine a-Physics of Condensed Matter Structure Defects and Mechanical Properties, 1984. **49**(1), 95-109 <http://dx.doi.org/10.1080/01418618408233432>
13. *Bloch Wave HREM*. Marks, L.D., Ultramicroscopy, 1984. **14**(4), 351-355 [http://dx.doi.org/10.1016/0304-3991\(84\)90220-1](http://dx.doi.org/10.1016/0304-3991(84)90220-1)
14. *Direct Atomic Imaging of Solid-Surfaces .1. Image Simulation and Interpretation*. Marks, L.D., Surface Science, 1984. **139**(1), 281-298 [http://dx.doi.org/10.1016/0039-6028\(84\)90022-0](http://dx.doi.org/10.1016/0039-6028(84)90022-0)
15. *Dispersive Equations for High-Resolution Imaging and Lattice Fringe Artifacts*. Marks, L.D., Ultramicroscopy, 1984. **12**(3), 237-242 [http://dx.doi.org/10.1016/0304-3991\(83\)90264-4](http://dx.doi.org/10.1016/0304-3991(83)90264-4)

16. *Surface-Structure and Energetics of Multiply Twinned Particles*. Marks, L.D., Philosophical Magazine a-Physics of Condensed Matter Structure Defects and Mechanical Properties, 1984. **49**(1), 81-93
<http://dx.doi.org/10.1080/01418618408233431>
17. *And the image was simulated*. Marks, L.D., Ultramicroscopy, 1984. **14**(4), 317
[http://dx.doi.org/10.1016/0304-3991\(84\)90216-x](http://dx.doi.org/10.1016/0304-3991(84)90216-x)
18. *Direct Observation of Elastic and Plastic-Deformations at Au(111) Surfaces*. Marks, L.D., V. Heine, and D.J. Smith, Physical Review Letters, 1984. **52**(8), 656-658
<http://dx.doi.org/10.1103/PhysRevLett.52.656>
19. *Direct Atomic Imaging of Solid-Surfaces .2. Gold (111) Surfaces during and after Insitu Carbon Etching*. Marks, L.D. and D.J. Smith, Surface Science, 1984. **143**(2-3), 495-508
[http://dx.doi.org/10.1016/0039-6028\(84\)90555-7](http://dx.doi.org/10.1016/0039-6028(84)90555-7)
20. *Image Localization*. Marks, L.D., Ultramicroscopy, 1985. **18**(1-4), 33-37
[http://dx.doi.org/10.1016/0304-3991\(85\)90119-6](http://dx.doi.org/10.1016/0304-3991(85)90119-6)
21. *Imaging small particles*. Marks, L.D., Ultramicroscopy, 1985. **18**(1-4), 445-452
[http://dx.doi.org/10.1016/0304-3991\(85\)90164-0](http://dx.doi.org/10.1016/0304-3991(85)90164-0)
22. *Direct Observation of Diffractive Probe Spreading*. Marks, L.D., Ultramicroscopy, 1985. **16**(2), 261-264
[http://dx.doi.org/10.1016/0304-3991\(85\)90080-4](http://dx.doi.org/10.1016/0304-3991(85)90080-4)
23. *Inhomogeneous Strains in Small Particles*. Marks, L.D., Surface Science, 1985. **150**(2), 302-318
[http://dx.doi.org/10.1016/0039-6028\(85\)90648-X](http://dx.doi.org/10.1016/0039-6028(85)90648-X)
24. *Particle-Size Effects on Wulff Constructions*. Marks, L.D., Surface Science, 1985. **150**(2), 358-366
[http://dx.doi.org/10.1016/0039-6028\(85\)90652-1](http://dx.doi.org/10.1016/0039-6028(85)90652-1)
25. *Electronically Induced Geometrical Catalytic Effects*. Marks, L.D. and V. Heine, Journal of Catalysis, 1985. **94**(2), 570-572
[http://dx.doi.org/10.1016/0021-9517\(85\)90223-4](http://dx.doi.org/10.1016/0021-9517(85)90223-4)
26. *Atomic Imaging of Particle Surfaces*. Marks, L.D. and D.J. Smith, Acs Symposium Series, 1985. **288**, 341-350
<http://dx.doi.org/10.1021/bk-1985-0288.ch029>
27. *Direct Atomic Imaging of Solid-Surfaces .4. Dislocations on Au(100)*. Marks, L.D. and D.J. Smith, Surface Science, 1985. **157**(1), L367-L372
[http://dx.doi.org/10.1016/0039-6028\(85\)90630-2](http://dx.doi.org/10.1016/0039-6028(85)90630-2)
28. *Direct Atomic Imaging of Solid-Surfaces .3. Small Particles and Extended Au Surfaces*. Smith, D.J. and L.D. Marks, Ultramicroscopy, 1985. **16**(1), 101-113
[http://dx.doi.org/10.1016/S0304-3991\(85\)80013-9](http://dx.doi.org/10.1016/S0304-3991(85)80013-9)
29. *The Role of Volume and Pairwise Forces in the Reconstruction of Noble-Metal Surfaces*. Heine, V. and L.D. Marks, Journal of Electron Spectroscopy and Related Phenomena, 1986. **38**(1-4), 229-232
[http://dx.doi.org/10.1016/0368-2048\(86\)85093-9](http://dx.doi.org/10.1016/0368-2048(86)85093-9)
30. *Competition between Pairwise and Multi-Atom Forces at Noble-Metal Surfaces*. Heine, V. and L.D. Marks, Surface Science, 1986. **165**(1), 65-82
[http://dx.doi.org/10.1016/0039-6028\(86\)90664-3](http://dx.doi.org/10.1016/0039-6028(86)90664-3)
31. *Solid-Like Growth*. Marks, L.D., Thin Solid Films, 1986. **136**(2), 309-315
[http://dx.doi.org/10.1016/0040-6090\(86\)90290-7](http://dx.doi.org/10.1016/0040-6090(86)90290-7)

32. *Quasi-Melting of Small Particles*. Marks, L.D., P.M. Ajayan, and J. Dundurs, *Ultramicroscopy*, 1986. **20**(1-2), 77-82 [http://dx.doi.org/10.1016/0304-3991\(86\)90172-5](http://dx.doi.org/10.1016/0304-3991(86)90172-5)
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