

Ju Li

Employment *Massachusetts Institute of Technology* Cambridge, MA 02139
Battelle Energy Alliance Professor of Nuclear Science and Engineering,
Full Professor (7/2011-present), Department of Nuclear Science and Engineering
and Department of Materials Science and Engineering

University of Pennsylvania Philadelphia, PA 19104
Associate Professor of Materials Science and Engineering (9/2007-6/2011)

Ohio State University Columbus, OH 43210
Assistant Professor of Materials Science and Engineering (9/2002-9/2007)

Massachusetts Institute of Technology Cambridge, MA 02139
Research scientist (4/2002-9/2002), postdoctoral associate (9/2000-4/2002)
Departments of Nuclear Engineering and Materials Science and Engineering

Education *Massachusetts Institute of Technology* Cambridge, MA 02139
Department of Nuclear Engineering (1994-2000) Ph.D., Sept. 2000

University of Science and Technology of China Hefei, Anhui 230026, P.R.C.
Special Class for Gifted Young (1990-1994) B.S. in Physics, 1994

Honors & Awards Fellow of the Materials Research Society (2017)

Fellow of the American Physical Society (2014)

Thomson Reuters *Highly Cited Researchers* 2014, among 147 scientists world-wide in *Materials Science* category based on papers published between 2002-2012, and among “*The World’s Most Influential Scientific Minds 2014*”

Lee Hsun Young Scientist Lecture Series on Materials Science, Institute of Metal Research, Chinese Academy of Sciences (2011)

Chinese Ministry of Education and Li Ka Shing Foundation Chang Jiang Scholar Award (2009)

TMS Robert Lansing Hardy Award (2009)

Technology Review TR35 award (2007)

National Academy of Engineering U.S. Frontiers of Engineering Symposium (Microsoft Research, Sept. 2007) and German-American Frontiers of Engineering Symposium (Oak Ridge, April 2010) co-sponsored by the Alexander von Humboldt Foundation.

Materials Research Society (MRS) 2006 Outstanding Young Investigator Award

Ohio State University College of Engineering Lumley Research Award 2006
Presidential Early Career Award for Scientists and Engineers (PECASE) 2005
Materials Research Society (MRS) Graduate Student Silver Medalist 1998
MIT Nuclear Engineering Department Manson Benedict Fellowship 1996-1997

Service

Author of free molecular visualization software *AtomEye*:
<http://www.google.com/search?q=AtomEye>

Member of Editorial Board of *Nano Research* (Mar. 2008-), *Modelling and Simulation in Materials Science and Engineering* (Feb. 2008-), *Science China: Technological Sciences* (Jan. 2013-), *Extreme Mechanics Letters* (Aug. 2014-).

3-Member Executive Board (Oct. 2010-present) and International Advisory Board (Aug. 2009-present) of Multiscale Materials Modeling (MMM) conference series.

Lead Organizer of 2013 MRS Fall Meeting Symposium YY “*Elastic Strain Engineering for Unprecedented Materials Properties*”, and Lead Guest Editor of *MRS Bulletin* February 2014 special issue on Elastic Strain Engineering

Author of multiple perspective articles in *MRS Bulletin*

Issued Patents

2. Mar 14, 2017, US Patent 9595624 “[Strain-engineered bandgaps](#),” Ju Li, Xiaofeng Qian, Ji Feng.
1. Nov.1, 2016: US Patent 9484489 “[Engineered band gaps](#)”, Ju Li, Xiaofeng Qian, Menghao Wu.

Representative Publications (310+ peer-reviewed papers, 18,900+ SCI cites, h-index 70)¹

126. Y-G. Yao, Z-N. Huang, P-F. Xie, S.D. Lacey, R.J. Jacob, H. Xie, F-J. Chen, A-M. Nie, T-C. Pu, M. Rehwoldt, D-W. Yu, M.R. Zachariah, C. Wang, R. Shahbazian-Yassar, J. Li and L-B. Hu, “[Carbothermal shock synthesis of high-entropy-alloy nanoparticles](#),” *Science* **359** (2018) 1489-1494.
125. K.P. So, A. Kushima, J.G. Park, X-H. Liu, D.H. Keum, H.Y. Jeong, F. Yao, S.H. Joo, H.S. Kim, H. Kim, J. Li and Y.H. Lee, “[Intragranular Dispersion of Carbon Nanotubes Comprehensively Improves Aluminum Alloys](#),” *Advanced Science* (2018) 1800115.

¹ ResearcherID: A-2993-2008 ISI Web of Knowledge search keywords: “Li J” in Author and “nucl same engn same 02139 or mat same 43210 or mat same Univ Penn or 2041 same Columbus” in Address. See also all publications ranked by Google Scholar.

124. Q-J. Li, B. Xu, S. Hara, J. Li and E. Ma, "Sample-size-dependent surface dislocation nucleation in nanoscale crystals," *Acta Materialia* **145** (2018) 19-29.
123. L-M. Suo, W-J. Xue, M. Gobet, S.G. Greenbaum, C. Wang, Y-M. Chen, W-L. Yang, Y-X. Li and J. Li, "Fluorine-donating electrolytes enable highly reversible 5V-class Li metal batteries," *PNAS* **115** (2018) 1156-1161.
122. Y. Yang, Y.G. Li, M.P. Short, C-S. Kim, K.K. Berggren and J. Li, "Nano-beam and nano-target effects in ion radiation," *Nanoscale* **10** (2018) 1598-1606.
121. G-Y. Xu, A. Kushima, J-R. Yuan, H. Dou, W-J. Xue, X-G. Zhang, X-H. Yan and J. Li, "Ad hoc Solid Electrolyte on Acidized Carbon Nanotube Paper Improves Cycle Life of Lithium-Sulfur Batteries," *Energy & Environmental Science* **10** (2017) 2544-2551.
120. L-M. Suo, D. Oh, Y-X. Lin, Z-Q. Zhuo, O. Borodin, T. Gao, F. Wang, A. Kushima, Z-Q. Wang, H-C. Kim, Y. Qi, W-L. Yang, F. Pan, J. Li, K. Xu and C-S. Wang, "How Solid-Electrolyte Interphase Forms in Aqueous Electrolytes," *J. Am. Chem. Soc.* **10** (2017) 18670-18680.
119. W-J. Xue, L-X. Miao, L. Qie, C. Wang, S. Li, J-L. Wang and J. Li, "Gravimetric and volumetric energy densities of lithium-sulfur batteries," *Current Opinion in Electrochemistry* **6** (2017) 92-99.
118. S-T. Wang, W. Quan, Z. Zhu, Y. Yang, Q. Liu, Y. Ren, X-Y. Zhang, R. Xu, Y. Hong, Z-T. Zhang, K. Amine, Z-L. Tang, J. Lu and J. Li, "Lithium titanate hydrates with superfast and stable cycling in lithium ion batteries," *Nature Communications* **8** (2017) 627.
117. Y-M. Chen, X-Y. Li, K-S. Park, W. Lu, C. Wang, W-J. Xue, F. Yang, J. Zhou, L-M. Suo, T-Q. Lin, H-T. Huang, J. Li and J.B. Goodenough, "Nitrogen-Doped Carbon for Sodium-Ion Battery Anode by Self-Etching and Graphitization of Bimetallic MOF-Based Composite," *Chem* **3** (2017) 152-163.
116. S-L. Zhang, K-J. Zhao, T. Zhu and J. Li, "Electrochemomechanical degradation of high-capacity battery electrode materials," *Progress in Materials Science* **89** (2017) 479-521.
115. Y-H. Zheng, Y-S. Wang, Y-X. Lu, Y-S. Hu and J. Li, "A high-performance sodium-ion battery enhanced by macadamia shell derived hard carbon anode," *Nano Energy* **39** (2017) 489-498.
114. G-Y. Xu, Q-B. Yan, S-T. Wang, A. Kushima, P. Bai, K. Liu, X-G. Zhang, Z-L. Tang and J. Li, "A thin multifunctional coating on a separator improves the cyclability and safety of lithium sulfur batteries," *Chemical Science* **8** (2017) 6619-6625.
113. W-J. Xue, Q-B. Yan, G-Y. Xu, L-M. Suo, Y-M. Chen, C. Wang, C-A. Wang and J. Li, "Double-oxide sulfur host for advanced lithium-sulfur batteries," *Nano Energy* **38** (2017) 12-18.

112. M-J. Lee, E-S. Lho, P. Bai, S-J. Chae, J. Li and J-P. Cho, "Low-Temperature Carbon Coating of Nanosized $\text{Li}_{1.015}\text{Al}_{1.06}\text{Mn}_{1.925}\text{O}_4$ and High-Density Electrode for High-Power Li-Ion Batteries," *Nano Letters* **17** (2017) 3744-3751.
111. W-Z. Han, J. Zhang, M-S. Ding, L. Lv, W-H. Wang, G-H. Wu, Z-W. Shan and J. Li, "Helium Nanobubbles Enhance Superelasticity and Retard Shear Localization in Small-Volume Shape Memory Alloy," *Nano Letters* **17** (2017) 3725-3730.
110. B.Y. Guan, A. Kushima, L. Yu, S. Li, J. Li and X.W. Lou, "Coordination Polymers Derived General Synthesis of Multishelled Mixed Metal-Oxide Particles for Hybrid Supercapacitors," *Advanced Materials* **29** (2017) 1605902.
109. W-B. Li, L. Sun, J-S. Qi, P. Jarillo-Herrero, M. Dinca and J. Li, "High temperature ferromagnetism in pi-conjugated two-dimensional metalorganic frameworks," *Chemical Science* **8** (2017) 2859-2867.
108. K. Liu, P. Bai, M.Z. Bazant, C-A. Wang and J. Li, "A soft non-porous separator and its effectiveness in stabilizing Li metal anodes cycling at 10 mA cm⁻² observed in situ in a capillary cell," *Journal of Materials Chemistry A* **5** (2017) 4300-4307.
107. M. Li, D-G. Xie, E. Ma, J. Li, X-X. Zhang and Z-W. Shan, "Effect of hydrogen on the integrity of aluminium-oxide interface at elevated temperatures," *Nature Communications* **8** (2017) 14564.
106. Y. Jin, S. Li, A. Kushima, X-Q. Zheng, Y-M. Sun, J. Xie, J. Sun, W-J. Xue, G-M. Zhou, J. Wu, F-F. Shi, R-F. Zhang, Z. Zhu, K-P. So, Y. Cui and J. Li, "Self-healing SEI enables full-cell cycling of a silicon-majority anode with a coulombic efficiency exceeding 99.9%," *Energy & Environmental Science* **10** (2017) 580-592.
105. A. Kushima, K.P. So, C. Su, P. Bai, N. Kuriyama, T. Maebashi, Y. Fujiwara, M.Z. Bazant and J. Li, "Liquid cell transmission electron microscopy observation of lithium metal growth and dissolution: Root growth, dead lithium and lithium flotsams," *Nano Energy* **32** (2017) 271-279.
104. S-T. Wang, Y. Yang, W. Quan, Y. Hong, Z-T. Zhang, Z-L. Tang and J. Li, "Ti³⁺-free three-phase $\text{Li}_4\text{Ti}_5\text{O}_{12}/\text{TiO}_2$ for high-rate lithium ion batteries: Capacity and conductivity enhancement by phase boundaries," *Nano Energy* **32** (2017) 294-301.
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101. S-Z. Li, Q-Y. Li, R.W. Carpick, P. Gumbsch, X.Z. Liu, X-D. Ding, J. Sun and J. Li, "The evolving quality of frictional contact with graphene," *Nature* **539** (2016) 541-545.

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99. K.P. So, X-H. Liu, H. Mori, A. Kushima, J.G. Park, H.S. Kim, S. Ogata, Y.H. Lee and J. Li, "Ton-scale metal-carbon nanotube composite: The mechanism of strengthening while retaining tensile ductility," *Extreme Mechanics Letters* **8** (2016) 245-250.
98. X-H. Liu, J-F. Gu, Y. Shen and J. Li, "Crystal metamorphosis at stress extremes: how soft phonons turn into lattice defects," *NPG Asia Materials* **8** (2016) e320.
97. J-Y. Zhang, Y-W. Mao, D. Wang, J. Li and Y-Z. Wang, "Accelerating ferroic ageing dynamics upon cooling," *NPG Asia Materials* **8** (2016) e319.
96. Q-J. Li, J. Li, Z-W. Shan and E. Ma, "Surface Rebound of Relativistic Dislocations Directly and Efficiently Initiates Deformation Twinning," *Phys. Rev. Lett.* **117** (2016) 165501.
95. Q-J. Li, J. Li, Z-W. Shan and E. Ma, "Strongly correlated breeding of high-speed dislocations," *Acta Materialia* **119** (2016) 229-241.
94. Z-Q. Liu, Z-Y. Yin, C. Cox, M. Bosman, X-F. Qian, N. Li, H-Y. Zhao, Y-P. Du, J. Li and D.G. Nocera, "Room temperature stable CO_x-free H₂ production from methanol with magnesium oxide nanophotocatalysts," *Science Advances* **2** (2016) e1501425.
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92. Z. Zhu, A. Kushima, Z-Y. Yin, L. Qi, K. Amine, J. Lu and J. Li, "Anion-redox nanolithia cathodes for Li-ion batteries," *Nature Energy* **1** (2016) 16111.
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89. W-B. Li and J. Li, "Ferroelasticity and domain physics in two-dimensional transition metal dichalcogenide monolayers," *Nature Communications* **7** (2016) 10843.
88. X. Ge, C-D. Gu, Z-Y. Yin, X-L. Wang, J-P. Tu and J. Li, "Periodic stacking of 2D charged sheets: Self-assembled superlattice of NiAl layered double hydroxide (LDH) and reduced graphene oxide," *Nano Energy* **20** (2016) 185-193.
87. S-T. Kim, S.J. Choi, K-J. Zhao, H. Yang, G. Gobbi, S-L. Zhang and J. Li, "Electrochemically driven mechanical energy harvesting," *Nature Communications* **7** (2016) 10146.

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85. W-B. Li and J. Li, "Piezoelectricity in two-dimensional group-III monochalcogenides," *Nano Research* **8** (2015) 3796-3802.
84. A. Kushima, T. Koido, Y. Fujiwara, N. Kuriyama, N. Kusumi and J. Li, "Charging/Discharging Nanomorphology Asymmetry and Rate-Dependent Capacity Degradation in Li-Oxygen Battery," *Nano Letters* **15** (2015) 8260-8265.
83. W. Guo, Z. Wang and J. Li, "Diffusive versus Displacive Contact Plasticity of Nanoscale Asperities: Temperature- and Velocity-Dependent Strongest Size," *Nano Letters* **15** (2015) 6582-6585.
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78. X-F. Qian, L. Fu and J. Li, "Topological crystalline insulator nanomembrane with strain-tunable band gap," *Nano Research* **8** (2015) 967-979.
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74. J. Sun, L-B. He, Y-C. Lo, T. Xu, H-C. Bi, L-T. Sun, Z. Zhang, S. X. Mao and J. Li, "Liquid-like pseudoelasticity of sub-10-nm crystalline silver particles," *Nature Materials* **13** (2014) 1007-1012.
73. J. Li, Z-W. Shan and E. Ma, Guest Editors, "Elastic strain engineering for unprecedented materials properties," *MRS Bulletin* **39** (2014) 108-114.

72. M-H. Wu, X-F. Qian and J. Li, "Tunable Exciton Funnel Using Moire Superlattice in Twisted van der Waals Bilayer," *Nano Letters* **14** (2014) 5350-5357.
71. W-B. Li, H-Y. Fan and J. Li, "Deviatoric Stress-Driven Fusion of Nanoparticle Superlattices," *Nano Letters* **14** (2014) 4951-4958.
70. J-J. Niu, A. Kushima, X-F. Qian, L. Qi, K. Xiang, Y-M. Chiang and J. Li, "In Situ Observation of Random Solid Solution Zone in LiFePO₄ Electrode," *Nano Letters* **14** (2014) 4005-4010.
69. P-Y. Zhao, J. Li and Y-Z. Wang, "Extended defects, ideal strength and actual strengths of finite-sized metallic glasses," *Acta Materialia* **73** (2014) 149-166.
68. X-W. Fu, C. Su, Q. Fu, X-L. Zhu, R. Zhu, C-P. Liu, Z-M. Liao, J. Xu, W-L. Guo, J. Feng, J. Li and D-P. Yu, "Tailoring Exciton Dynamics by Elastic Strain-Gradient in Semiconductors," *Advanced Materials* **26** (2014) 2572-2579.
67. B-Y. Liu, J. Wang, B. Li, L. Lu, X-Y. Zhang, Z-W. Shan, J. Li, C-L. Jia, J. Sun and E. Ma, "Twinning-like lattice reorientation without a crystallographic twinning plane," *Nature Communications* **5** (2014) 3297.
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61. P.Y. Zhao, J. Li and Y.Z. Wang, "Heterogeneously randomized STZ model of metallic glasses: Softening and extreme value statistics during deformation," *Int. J. Plasticity* **40** (2013) 1-22.
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49. Q. Yu, L. Qi, K. Chen, R.K. Mishra, J. Li and A.M. Minor, "The Nanostructured Origin of Deformation Twinning," *Nano Letters* **12** (2012) 887-892.
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