

Leon Shaw – Recent Publications

Recent Journal Articles (*Corresponding author):

J. Wang and L. Shaw*, “Nanocrystalline Hydroxyapatite with Simultaneous Enhancements in Hardness and Toughness,” *Biomaterials*, in press.

J. Wang and L. Shaw*, “Grain-Size Dependence of the Hardness of Submicrometer and Nanometer Hydroxyapatite,” *J. Am. Ceram. Soc.*, in press.

L. Shaw*, J.-W. Tian, A. L. Ortiz, K. Dai, J. C. Villegas, P. K. Liaw, R. Ren, D. L. Klarstrom, “A Direct Comparison in the Fatigue Resistance Enhanced by Surface Severe Plastic Deformation and Shot Peening in a C-2000 Superalloy,” *Mater. Sci. Eng.*, in press.

T. Markmaitree and L. Shaw*, “Synthesis and Properties of $\text{Li}_2\text{Mg}(\text{NH})_2$,” *J. Power Sources*, in press.

A. L. Ortiz, J.-W. Tian, L. Shaw*, P. K. Liaw, “Experimental Study of the Microstructure and Stress State of Shot Peened and Surface Mechanical Attrition Treated Nickel Alloy,” *Scripta Mater.*, in press.

C. A. Galán, A. L. Ortiz*, F. Guiberteau, and L. Shaw, “Crystallite Size Refinement of ZrB_2 by High-Energy Ball Milling,” *J. Am. Ceram. Soc.*, in press.

J. C. Villegas and L. Shaw*, “Nanocrystallization Process and Mechanism in a Nickel Alloy Subjected to Surface SPD,” *Acta Mater.*, in press.

L. Shaw*, C. Shen, E. L. Thomas, “Synthesis of Gadolinia-Doped Ceria Gels and Powders from Acetylacetonate Precursors,” *J. Sol-Gel Sci. Technol.*, in press.

K. Peng, Y. Zhang, L. Shaw*, K.-W. Qian, “Microstructure Dependence of a Cu-38Zn Alloy on Processing Conditions of Constrained Groove Pressing,” *Acta Mater.*, 57, 5543–5553 (2009).

J. W. Tian, L. Shaw, Y. D. Wang, Y. Yokoyama, and P. K. Liaw*, “A Study on the Surface Severe Plastic Deformation Behavior of a Zr-Based Bulk Metallic Glass,” *Intermetallics*, 17 [11] 951-957 (2009).

W. Osborn, T. Markmaitree, L. Shaw*, J. Z. Hu, J. H. Kwak, and Z. G. Yang, “Low Temperature Milling of the $\text{LiNH}_2 + \text{LiH}$ Hydrogen Storage System,” *Int. J. Hydrogen Energy*, 34, 4331-4339 (2009).

J. Wang and L. Shaw*, “Synthesis of High Purity Hydroxyapatite Nanopowder via Sol-Gel Combustion Process,” *J. Mater. Sci. Mater. Med.*, 20, 1223-1227 (2009).

W. Osborn, T. Markmaitree, and L. Shaw*, “Long-Term Hydriding and Dehydriding Stability of the Nanoscale $\text{LiNH}_2 + \text{LiH}$ Hydrogen Storage System,” *Nanotechnology*, 20, 204028 (2009).

J. Z. Hu*, J. H. Kwak, Z. Yang, X. Wan, and L. Shaw*, “Direct Observation of Ion Exchange in Mechanically Activated LiH+MgB₂ System Using Ultra-High Field Nuclear Magnetic Resonance Spectroscopy,” *Appl. Phys. Lett.*, 94, 141905 (2009).

W. Osborn, T. Markmaitree, L. Shaw*, R. Ren, J. Z. Hu, J. H. Kwak, and Z. G. Yang, “Solid-State Hydrogen Storage: Storage Capacity, Thermodynamics, and Kinetics,” *JOM*, 61 [4] 45-51 (2009).

X. Wan, T. Markmaitree, W. Osborn, and L. Shaw*, “Nanoengineering-Enabled Solid-State Hydrogen Uptake and Release in the LiBH₄ plus MgH₂ System,” *J. Phys. Chem. C*, 112, 18232-18243 (2008).

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T. Markmaitree, W. Osborn and L. Shaw*, “Comparison between MgH₂- and LiH-Containing Systems for Hydrogen Storage Applications,” *Int. J. Hydrogen Energy*, 33, 3915-3924 (2008).

J. W. Tian, K. Dai, J. C. Villegas, L. Shaw*, P. K. Liaw, D. L. Klarstrom, and A. L. Ortiz, “Tensile Deformation Behavior of a Nickel Alloy Subjected to Surface Severe Plastic Deformation,” *Mater. Sci. Eng.*, 493, 176-183 (2008).

J. Z. Hu*, J. H. Kwak, Z. G. Yang, W. Osborn, T. Markmaitree, and L. Shaw, “Investigation of Mechanical Activation on Li-N-H Systems using ⁶Li MAS NMR at Ultrahigh Field,” *J. Power Sources*, 182, 278-283 (2008).

K. Dai and L. Shaw*, “Analysis of Fatigue Resistance Improvements via Surface Severe Plastic Deformation,” *Int. J. Fatigue*, 30 [8] 1398-1408 (2008).

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J. Z. Hu*, J. H. Kwak, Z. G. Yang, W. Osborn, T. Markmaitree, and L. Shaw, “Probing the Reaction Pathway of Dehydrogenation of the LiNH₂ + LiH Mixture using In-Situ 1H NMR Spectroscopy,” *J. Power Sources*, 181, 116-119 (2008).

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- J. Wang and L. Shaw*, "Morphology-Enhanced Low Temperature Sintering of Nanocrystalline Hydroxyapatite," *Advanced Materials*, 19, 2364-2369 (2007).
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L. Shaw, "Mechanical-Activation-Based Material Processing," in *Proceedings of the Ninth International Symposium of Processing and Fabrication of Advanced Materials*, St. Louis, October 9 – 12 (2000).

J. Crocker, L. Shaw and H. Marcus, "Gas Phase Solid Freeform Fabrication of SALDVI of SiC Cermets," in *Solid Freeform and Additive Fabrication 2000*, S.C. Danforth, D.B. Dimos, and F. Prinz, Eds., Materials Research Society, Pittsburgh, PA, Vol. 625, pp. 211-217 (2000).

J. Crocker, L.-C. Sun, S. Harrison, L. Shaw and H. Marcus, "Localized CVD and the Ultrafine Grain Structure," in *Ultrafine Grain Materials*, R. S. Mishra, S. L. Semiatin, C. Suryanarayana and N. Thadhani, Eds., A Publication of TMS, pp. 13 – 21 (2000).

X. Li, J. Crocker, E. Geiss, L. Shaw, H. Marcus and T. Cameron, "Evaluation of Microstructure and Properties for Multi-Materials Laser Densification of Dental Restorations," in *Proceedings of the 11th Annual SFF Symposium*, edited by D. L. Bourell, J. J. Beaman, R. H. Crawford, H. L. Marcus and J. W. Barlow, The University of Texas, 2000, pp. 159 – 167.

K. Dai, P. Klemens and L. Shaw, "Numerical Simulation of Bi-Materials Laser Densification," in *Proceedings of the 11th Annual SFF Symposium*, edited by D. L. Bourell, J. J. Beaman, R. H. Crawford, H. L. Marcus and J. W. Barlow, The University of Texas, 2000, pp. 386 – 392.

K. Dai, J. Crocker, L. Shaw and H. Marcus, "Finite Element Analysis of the SALDVI Process," in *Proceedings of the 11th Annual SFF Symposium*, edited by D. L. Bourell, J. J. Beaman, R. H. Crawford, H. L. Marcus and J. W. Barlow, The University of Texas, 2000, pp. 393 – 398.

J. Crocker, L. Shaw and H. Marcus, "Gas Phase Solid Freeform Fabrication of SiC Cermets Using SALDVI," in *Proceedings of the 11th Annual SFF Symposium*, edited by D. L. Bourell, J. J. Beaman, R. H. Crawford, H. L. Marcus and J. W. Barlow, The University of Texas, 2000, pp. 168 – 175.

Recent Invited Presentations:

L. Shaw, X. Wan, Y. Zhong, and K. Crosby, "Novel Hydrogen Storage Properties Derived from Nanoscale LiBH₄," Invited Presentation in the Conference of "[Materials Challenges in Alternative & Renewable Energy 2010](#)," Cocoa Beach, Florida, February 21-25, 2010.

J. Wang and L. Shaw, "Grain-Size Dependence of the Hardness and Toughness of Submicrometer and Nanometer Hydroxyapatite," Invited Presentation in the symposium of "Next Generation Biomaterials" at the MS&T 2009 Meeting, Pittsburgh, Pennsylvania, October 25 – 29, 2009.

A. L. Ortiz, J.-W. Tian, L. Shaw, P. K. Liaw, "Experimental Study of the Microstructure and Stress State of Shot Peened and Surface Severely Plastically Deformed Nickel Alloys," Invited

Presentation in the symposium of “Structural Materials for Aerospace and Defense: Challenges and Prospects” at the MS&T 2009 Meeting, Pittsburgh, Pennsylvania, October 25 – 29, 2009.

J. Wang and L. Shaw, “Simultaneous Enhancements in the Hardness and Toughness of Nanocrystalline Hydroxyapatite,” Invited Presentation at the Symposium on “Advances in Biomedical and Biomimetic Materials” in the MS&T 2008 Meeting, Pittsburgh, Pennsylvania, October 5-9, 2008.

J. Wang and L. Shaw, “Dense Nanocrystalline Hydroxyapatite Fabricated via Morphology-Enhanced Low Temperature Sintering,” Invited Presentation at the Symposium on “Nanotechnology: Controlled Processing of Nanoparticle Structures and Composites” in the MS&T 2008 Meeting, Pittsburgh, Pennsylvania, October 5-9, 2008.

L. Shaw, T. Markmaitree, W. Osborn, X. Wan, K. Crosby, Z. G. Yang, J. Z. Hu, and J. H. Kwak, “Effects and Mechanisms of Mechanical Activation on Hydrogen Sorption/Desorption of Nanoscale Lithium Nitrides,” Invited Presentation at the FreedomCAR and Fuel Hydrogen Storage Technical Team Meeting, Detroit, MI, May 14, 2008.

L. Shaw, K.-P. Peng, L. Su, and K.-W. Qian, “Grain Refinement and Mechanical Properties of Two-Phase Cu-Zn Alloys Subject to Constrained Groove Pressing,” Invited Presentation in the “Fifth International Symposium on Ultrafine Grained Materials” at the TMS 2008 Annual Meeting, New Orleans, Louisiana, March 9 – 13, 2008.

R. Ren, T. Markmaitree, W. Osborn, L. Shaw, and Z. Yang, “Effects of Mechanical Activation on Dehydrogenation of the Lithium Amide and Lithium Hydride System,” Invited Presentation at the symposium on “Materials in Clean Powder System II: Fuel Cells, solar, and Hydrogen Based Technologies” in the TMS 2007 Annual Meeting, Orlando, FL, Feb 25 – March 1, 2007.

L. Shaw, “Nanostructured Lithium Amide and Lithium Hydride for Reversible Hydrogen Storage Applications,” Invited Presentation at WPI, March 28, 2007.

L. Shaw and H. Luo, “Multi-Phase Nanocrystalline Al Alloy for Elevated Temperature Applications,” Invited Presentation at the symposium on “Materials Processing Challenges for the Aerospace Industry” in MS&T ‘06, Cincinnati, Ohio, October 15-18, 2006.

L. Shaw, Z. Yang, T. Markmaitree, and W. Osborn, “Improving Hydrogen Sorption/Desorption of Lithium Imide-Amide-Hydride System via Mechanical Activation,” Invited Presentation at the FreedomCAR and Fuel Hydrogen Storage Technical Team Meeting, Detroit, MI, August 17, 2006.

L. Shaw and H. Luo, “Multi-Phase Nanocrystalline Al Alloy for Elevated Temperature Applications,” Invited Presentation at the symposium on “Materials Processing Challenges for the Aerospace Industry” in MS&T ‘06, Cincinnati, Ohio, October 15-18, 2006.

L. Shaw, J. Villegas and J. Huang “Strengthening via Nanotwins,” Invited Presentation at the symposium on “Nanocrystalline Materials” in THERMEC’ 2006, Vancouver, Canada, July 4 – 8, 2006.

L. Shaw and H. Luo, "On Tension/Compression Asymmetry of an Extruded Nanocrystalline Al-Fe-Cr-Ti Alloy," Invited Presentation at the 4th International Symposium on Ultrafine Grained Materials, held in the 135th TMS Annual Meeting, San Antonio, TX, March 12 – 16, 2006.

A. L. Vasiliev, A. L. Ortiz and L. Shaw, "Lattice Microstrain and Grain Boundary Structure in a Nanocrystalline Al Alloy Prepared via Mechanical Alloying," Invited Presentation at the Symposium on Surface and Interfaces in Nanostructured Materials in the TMS 2004 Annual Meeting, Charlotte, NC, March 14-18, 2004.

L. Shaw, X.-X. Li and J.-W. Wang, "Slurry Extrusion and Laser Densification in Rapid Prototyping for Dental Restoration," Invited Presentation at the Symposium on Powder Materials: Current Research and Industrial Practices in the 2003 TMS Fall Meeting, Chicago, IL, November 9 – 12, 2003.

J. Villegas, K. Dai and L. Shaw, "Surface Roughness Evolution in the Surface Nanocrystallization and Hardening (SNH) Process," Invited Presentation at the Twelfth International Symposium on Processing and Fabrication of Advanced Materials: XII at the ASM 2003 Materials Solutions Conference, Pittsburgh, PA, October 13 – 16, 2003.

L. Shaw, "Investigation of a Nanostructured Al-Fe-Cr-Ti Alloy for High Temperature Structural Applications," Invited Presentation at the Eastern New York ASM and Hudson-Mohawk TMS Spring Symposium: Frontiers in Materials Development: Computation, Nanomaterials, and Alternative Energy, Schenectady, NY, May 12-13, 2003.

L. Shaw, "Processing and Properties of Nanostructured Al₉₃Fe₃Cr₂Ti₂ for High Temperature Structural Applications," Invited Presentation at WPI, February 27, 2003.

L. Shaw, J. Villegas, H. Luo and D. Miracle, "Thermal Stability of Nanostructured Al-Fe-Cr-Ti Alloys Prepared via Mechanical Alloying," Invited Presentation at THERMEC'2003: International Conference on Processing & Manufacturing of Advanced Materials, Leganes, Madrid, Spain, July 7 – 11, 2003.

Jim Crocker, E. Geiss, H. Wei, L. Shaw and H. Marcus, "Gas Phase Solid Freeform Fabrication," Keynote Presentation at the Symposium on Rapid Prototyping of Materials in the 2002 TMS Fall Meeting, Columbus, OH, October 6 – 10, 2002.

K. Dai and L. Shaw, "Finite Element Analysis of Distortion Minimization in Layer-by-Layer Laser-Processed Components," Invited Presentation at the Symposium on Rapid Prototyping of Materials in the 2002 TMS Fall Meeting, Columbus, OH, October 6 – 10, 2002.

M. Gell, E. H. Jordan, Y. H. Sohn, D. Goberman, L. Shaw, T. L. Bergman, B. Cetegen, S. Jiang, M. Wang, T.D. Xiao, Y. Wang and P. Strutt, "Development and Implementation of Plasma Sprayed Nanostructured Ceramic Coatings," Invited Presentation at the International Conference on Processing & Manufacturing of Advanced Materials, THERMEC' 2000, Las Vegas, Nevada, December 4 – 8, 2000.

L. Shaw, D. Goberman, Y. H. Sohn, E. Jordan and M. Gell, "Mechanical Properties of Nanostructured Al₂O₃ – TiO₂ Coatings," Invited Presentation at the symposium of "Structure and

Mechanical Properties of Nanophase Materials” at the MRS 2000 Fall meeting, Boston, Massachusetts, November 27 - December 1, 2000.

L. Shaw, “Mechanical-Activation-Based Materials Processing,” Invited Presentation at the Ninth International Conference on Processing and Fabrication of Advanced Materials at TMS Fall Meeting 2000, St. Louis, Missouri, October 9 – 12, 2000.

H. Marcus, S. Harrison, J. Crocker, L. Sun, E. Geiss and L. Shaw, “Gas Phase Solid Freeform Fabrication,” Invited Presentation at the symposium of “Solid Freeform and Additive Fabrication III” at the MRS 2000 Spring meeting, San Francisco, April 24 – 28, 2000.

L. Shaw, “Processing and Mechanical Properties of Thermally Sprayed Nano-Oxide Coatings,” Invited Presentation at WPI, April 13, 2000.

L. Shaw, “A Cost-Effective Way to Make Nanostructured Carbides and Nitrides,” Invited Presentation at the symposium of “Ultrafine Grained Materials”, the TMS 2000 Annual Meeting, Nashville, Tennessee, March 11-17, 2000.

H. Marcus, S. Harrison, L. Shaw, J. Crocker and L. Sun, “Localized CVD and the Ultrafine Grain Structure,” Invited Presentation at the symposium of “Ultrafine Grained Materials”, the TMS 2000 Annual Meeting, Nashville, Tennessee, March 11-17, 2000.

L. Shaw, “Solid Freeform Fabrication of Complex-Shaped Multi-Materials Components,” Invited Presentation at Barnes Engineering Division, EDO Corporation, Shelton, CT, January 2000.