

Jonathan Almer

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Overview

Jonathan Almer's research involves developing and utilizing advanced high-energy x-ray techniques for in-situ materials studies. Of particular interest is combining techniques, including wide- and small-angle scattering and near- and far-field diffraction microscopy, to investigate strain and microstructural evolution as a function of thermo-mechanical processing. Materials of interest include bio-materials, irradiated materials, coatings, batteries/fuel cells, and structural composites. Common aims of these studies are to improve materials design and provide stringent tests of computational models. In concert with other APS members he has led development of high-energy x-ray micro-focusing, and unique environmental chambers and detector arrays used at the APS. He has developed scientific code for analysis of two-dimensional diffraction data, used by a hundreds of APS users over the past decade.

Education

B.S. (Summa Cum Laude), North Park University, 1991.
 Ph.D., Materials Science and Engineering, Northwestern University, 1998.

Professional Experience

2009-pres Group Leader, Materials Physics and Engineering Group, ANL, Argonne, IL.
 2007-pres Physicist, Argonne National Laboratory, Argonne, IL.
 2003-2007 Assistant Physicist, Argonne National Laboratory, Argonne, IL.
 2000-2003 Postdoc, Argonne National Laboratory, Argonne, IL.
 1999-2000 Instructor and Postdoc, Linkoping University, Sweden.
 1994-1998 Graduate research assistant, Mat. Sci. Eng. Dept., Northwestern University
 1991-1992 Research assistant, Mat. Tech. Div., Argonne National Laboratory.

Awards

2006 Pacesetter Award, Argonne National Laboratory
 1997 ASM best presentation award, Hilliard Symposium, Northwestern University
 1997 U.S. Scholar, Northwestern University

Selected Funding Activities

1. "Coherence for High-Energy Diffraction", Y. Nashed, S.O. Hruszkewycz, J-S. Park, R.J. Harder, P. Kenesei and J. Almer; LDRD Prime- Hard X-ray Energy Sciences (2016-2019).
2. "Investigating grain dynamics in irradiated materials with High-Energy X-rays", M. Li, J. Almer and D. Brown, NEET-3 (Reactor Materials) (2016-2019).
3. "High-Energy X-ray Measurements to Support the Incorporation of Near Surface Residual Stresses into the Advanced Titanium Alloy Fatigue Modelling Program", I. Cernatescu, J. Almer, J. Okasinski and J.S. Park; Pratt and Whitney, Inc through Metals Affordability Initiative (2016-2018).
4. "Integration of Microwave Reactor with High-Energy X-ray Beamline for High-Throughput Screening Energetic Nanomaterials Synthesis", Y. Sun (PI), Y. Ren, J.S. Okasinski, J. Almer, K. Amine, J.S. Gregar, SI-LDRD Materials for Energy (2013-2016).
5. "Development of In-Situ Radioactive Material Probes using High-energy X-rays", M. Li and J. Almer, SI-LDRD Hard X-ray Sciences (2010-13).
6. "Combined Approaches Toward a Hierarchical Understanding of Battery Materials", K. Chapman, M. Balasubramanian, K. Nemeth, J. Almer, SI-LDRD Hard X-ray Sciences (2010-13)

7. "Non-collagenous matrix protein markers for predicting bone fragility", X. Wang, N. Dahorte, J. Almer, NIH (2009-2011).

Professional Activities

Member of TMS/ASM.

Thesis co-adviser to five PhD students (all at Northwestern University) from 2003-2014.

Beamline Advisory Team member, HEX Beamline at NSLS-II

National neutron and x-ray summer school, experiment and analysis coordinator, 2007-present.

Co-organizer, TMS Annual Meeting, "Characterization of Irradiated Materials using X-rays and Neutrons" Sessions, 2011, 2013 and 2015.

Co-organizer, Denver X-ray Conference, "Applications of High-energy X-rays" Sessions, 2005, 2011, 2013, 2015.

Selected Publications (>280 total, Google Scholar h-index 41, i10-index 156)

- Schuren, J, P. Shade, J. Bernier, S.F. Li, B. Blank, J. Lind, P. Kenesei, U. Lienert, R.M. Suter, T.J. Turner, D. M. Dimiduk and J. Almer, "New opportunities for quantitative tracking of polycrystal responses in three dimensions", *Curr Op. Sol. St. Mat. Sci*, 19 (4), pp. 235-244 (2015).
- Gallant, MA, D. Brown, M. Hammond, J. Wallace, J. Du, AC Deymier-Black, JD Almer, SR Stock, MR Allen and DB Burr, "Bone cell-independent benefits of raloxifene on the skeleton: A novel mechanism for improving bone material properties", *Bone* 61, p. 191-200 (2014).
- Shui, JL, J. Okasinski, P. Kenesei, H. Dobbs, D. Zhao, JD Almer and DJ Liu, "Reversibility of anodic lithium in rechargeable lithium-oxygen batteries", *Nature Communications* 4, art 2255 (2013).
- Liu, D.J. and J. Almer, "Phase and strain distributions associated with reactive contaminants inside of a solid oxide fuel cell", *Applied Physics Letters* 94(22), art 224106 (2009).
- Almer, J. and R.A. Winholtz, "X-ray stress analysis", in *Springer Handbook of Experimental Solid Mechanics*, Ed. W.N. Sharpe, pp. 801-820 (2008).
- Jensen, H., M. Bremholm, R.P. Nielsen, K.D. Joensen, J.S. Pedersen, H. Birkedal, Y.S. Chen, J. Almer, E.G. Sogaard, S.B. Iversen, and B.B. Iversen, "In situ high-energy synchrotron radiation study of sol-gel nanoparticle formation in supercritical fluids". *Angewandte Chemie-International Edition*. 46(7): p. 1113-1116 (2007).
- Jakobsen, B., H.F. Poulsen, U. Lienert, J. Almer, S.D. Shastri, H.O. Sorensen, C. Gundlach, and W. Pantleon, "Formation and subdivision of deformation structures during plastic deformation", *Science*, 312(5775), pp. 889-892 (2006).
- Hufnagel, T.C., R.T. Ott, and J. Almer, "Structural aspects of elastic deformation of a metallic glass", *Physical Review B*, 73(6), pp. 64204-1-8 (2006).
- Almer, J. and S. Stock, "Internal strains and stresses measured in cortical bone via high-energy x-ray diffraction", *Journal of Structural Biology*, 152, pp. 14-27 (2005).
- Almer, J.D., J.B. Cohen, and R.A. Winholtz, "The effects of residual macrostresses and microstresses on fatigue crack propagation", *Metallurgical and Materials Transactions A (Physical Metallurgy and Materials Science)*, 29A(8), pp. 2127-36 (1998).