

Nhon Q. Vo

Northwestern University
Materials Science and Engineering
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SUMMARY

Experience in designing variety of advanced materials and solving multi-scale scientific and industrial problems; experience in organizing small and large teams, involving students, professionals from universities and national laboratories, and engineers from cooperation; interested in transforming basic science to technology.

EDUCATION

University of Illinois, Urbana-Champaign (UIUC)

Department of Materials Science-Engineering

Ph.D. in Metallic Materials Science and Engineering- Aug 2011

B.S. in Electrical Materials Science and Engineering- May 2007

EXPERIENCE

Northwestern University

Postdoctoral Research Fellow

09/11 - present

(Advisors: Prof. D.N. Seidman, Prof. D.C. Dunand)

- Designing advanced Al-Sc-rare earth-transition-metal alloys for low-cost high-temperature automobile applications by controlling the nanostructures of aged precipitates, utilizing advanced Atom Probe Tomography (*funded by Ford-Boeing*)
- Investigating microstructure evolution of Al alloys under friction-stir process (*funded by Boeing*)
- Designing low-cost high-temperature high-strength aged-hardening ferritic steel for turbine applications, utilizing strength and creep experiments to validate computational designs (*funded by DOE*)

University of Illinois, Urbana-Champaign

Graduate Research Assistant

08/07 - 08/11

(Advisors: Prof. R.S. Averback, Prof. P. Bellon)

- Designed radiation resistant alloys with hierarchical nano-scale structure of both grains and precipitates for nuclear applications, utilizing both computational and experimental methods, including advanced instruments such as Transmission Electron Microscopy and Atom Probe Tomography (*funded by DOE*)
- Synthesized and computationally designed high-energy ball-milling process to fabricate large-quantity bulk alloys, owing hierarchical nanostructure, for variety of extreme-environment applications (*funded by NSF*)
- Computationally designed nanocrystalline alloys to reach maximum possible strength of the class, resulted in highly cited published articles (*funded by DOE*)

Los Alamos National Laboratory

Visiting Scholar

10/10 - 11/10

(Advisor: Dr. I. J. Beyerlein)

Nhon Q. Vo

- Investigated interface reaction to severe plastic deformation of advanced nano-laminated alloys, designed to withstand extreme-condition environments (*funded by DOE*)
- Provided guideline for the design of interfaces with high chemical stability during high-strain shear deformation (*funded by DOE*)

Lawrence Livermore National Laboratory

06/07 - 08/07

Intern Researcher

(Advisor: Dr. A. Caro)

- Investigated deformation mechanisms of nanocrystalline metals by computer simulations (funded by DOE)
- Computationally developed a unique quantitative analysis of plasticity using localized slip vectors to separate the contributions of dislocation activity from grain boundary sliding, which has been adopted by many well-known research groups around the world (funded by DOE)

University of Illinois, Urbana-Champaign

Undergraduate Research Assistant

12/05 - 05/07

(Advisor: Prof. R.S. Averback)

- Investigated irradiation damage effect of Platinum by computer simulations to explain the experimental results from Low-Energy Electron Microscopy

SKILLS AND EXPERTISE

Experiment

Microanalysis of materials

- Extensive experience in Advanced Atom-Probe Tomography (**APT**) analysis
- Transmission Electron Microscopy (**TEM/scanning-TEM**), Energy Dispersive X-ray (**EDS**), Scanning Electron Microscopy (**SEM**)
- Focused Ion Beam (**FIB**)
- X-ray diffraction (**XRD**), Rutherford Back-Scattering (**RBS**), Secondary Ion Mass Spectrometry (**SIMS**)
- Knowledge in Atomic Force Microscopy (**AFM**)

Metallurgy

- **Casting, heat treatment, metallography**
- Mechanical testings (**nano-indentation, tensile, hardness, creep**)
- Powder metallurgy (**ball milling, sintering**) to synthesize bulk materials

Thin film

- Thin film synthesis by Physical Vapor Deposition (**PVD**)

Ion irradiation

- Extensive use of **ion implantation** to study radiation damage of materials

Instrument development

- Extensive experience in **design, assemble** experimental instruments

Computer modeling

- Extensive experience in Molecular Dynamics (**MD**) simulation
- Kinetic Monte Carlo (**KMC**), Monte Carlo (**MC**) simulation
- **Labview, C language, Fortran,**
- Knowledge in **Thermo-Calc, Dictra**

Nhon Q. Vo

HONORS

Material Research Society (MRS) **Graduate Student Award-Gold metal** (2010)
Donald W. Hamer Fellowship for “exceptional new graduate student” (2007-2008)
Graduate Research Assistantship (2007-2011)

PROFESSIONAL ACTIVITIES

Member of Materials Research Society (MRS)
Member of the Minerals, Metals & Materials Society (TMS)
Member of American Society of Metals (ASM)
Reviewer of Journal of Materials Science and Engineering A
Reviewer of Journal of Alloys and Compounds
Judge for Chicago area undergraduate research symposium. (2012)
Symposium assistant at MRS conference. (2008)

REFEREED PUBLICATIONS

1. *A quantitative description of plastic deformation in nano-crystalline Cu: dislocation glide versus grain boundary sliding.*
Nhon Q. Vo, Samson Odunuga, Pascal Bellon, Robert S. Averback, Alfredo Caro.
Phys. Rev. B **78**, 134108 (2008)
Selected for Virtual Journal of Nanoscale Science and Technology
2. *Stress evolution in platinum thin films during low-energy ion irradiation.*
Wai-Lun Chan, Kai Zhao, **Nhon Q. Vo**, Yinon Ashkenazy, David G. Cahill, and Robert S. Averback.
Phys. Rev. B **77**, 205405 (2008)
3. *Limits of hardness at the nanoscale: Molecular dynamics simulations.*
Nhon Q. Vo, Pascal Bellon, Robert S. Averback, Alfredo Caro.
Phys. Rev. B **78**, 241402 (2008) *Rapid Communications*
Selected for Virtual Journal of Nanoscale Science and Technology
4. *Molecular dynamics simulations of shock compression of nickel: From monocrystals to nanocrystals.*
Hussam N Jarmakani, Eduardo M. Bringa, Paul Erhart, Bruce A. Remington, Yinmin M. Wang,
Nhon Q. Vo, Marc A. Meyers.
Acta Mater. **56**, 5584-5604 (2008)
5. *Yield strength in nanocrystalline Cu during high strain rate deformation.*
Nhon Q. Vo, Pascal Bellon, Robert S. Averback, Alfredo Caro.
Scripta Mater. **61** 76-79 (2009)
6. *Forced chemical mixing in immiscible alloys in severe plastic deformation at elevated temperatures.*
Nhon Q. Vo, Samson Odunuga, Pascal Bellon, Robert S. Averback.
Acta Mater. **57**, 3012-3019 (2009)
7. *Dynamic self-organization in Cu alloys under ion irradiation.*
See W Chee, Brad Stumphy, **Nhon Q. Vo**, Robert S. Averback, and Pascal Bellon.
Acta Mater. **58**, 4088-4099 (2010)
8. *Microstructural stability of nanostructured Cu alloys during high-temperature irradiation.*
Nhon Q. Vo, See W. Chee, Daniel Schwen, Xuan Zhang, Pascal Bellon, Robert S. Averback.
Scripta Mater. **63** 929 (2010).

Nhon Q. Vo

9. *Microstructural stability of nanostructured Cu-Nb-W alloys during high-temperature annealing and irradiation.*
Xuan Zhang, **Nhon Q. Vo**, Pascal Bellon, Robert S. Averback.
Acta Mater. **59**, 5332-5341 (2011)
10. *Reaching theoretical strengths in nanocrystalline Cu by grain boundary doping.*
Nhon Q. Vo, Jonathan Schafer, Robert S. Averback, Karsten Albe, Yinon Ashkenazy, Pascal Bellon.
Scripta Mater. **65** 660-663 (2011).
11. *Shear induced chemical mixing in heterogeneous systems.*
Yinon Ashkenazy, **Nhon Q. Vo**, Daniel Schwen, Robert S. Averback, Pascal Bellon.
Acta Mater. **60**, 984-993 (2012)
12. *Forced chemical mixing at Cu-Nb interfaces under severe plastic deformation.*
Nhon Q. Vo, Robert S. Averback, Yinon Ashkenazy, Pascal Bellon, Jian Wang
J. Mater. Res. **28**, 1621-1630 (2012)
13. *Grain boundary doping strengthens nanocrystalline copper alloys.*
Sezer Ozerinc, Kaiping Tai, **Nhon Q. Vo**, Robert S. Averback, Pascal Bellon, Shen Dilline, and William King
Scripta Mater. **67** 720-723 (2012).
14. *Atom-probe tomographic study of a friction-stir processed Al-Mg-Sc alloy.*
Nhon Q. Vo, David. C. Dunand, David N. Seidman
Acta Mater. **60**, 7078-7089 (2012)
15. *Atomic mixing in metals under shear deformation.*
Nhon Q. Vo, Jian Zhou, Yinon Ashkenazy, Daniel Schwen, Robert S. Averback, Pascal Bellon
Submitted to JOM by invitation
16. *Forced chemical mixing of ternary alloy Ag-Cu-Ni under severe plastic deformation.*
Nhon Q. Vo, Robert S. Averback, Michael Champion, Thuy Nguyen, Pascal Bellon, Brad Stumphy
(to be submitted)
17. *Optimization of creep resistance in dilute Al-Sc-Er-Zr alloys.*
Nhon Q. Vo, David. C. Dunand, David N. Seidman (to be submitted)
18. *Effect of Si additions in dilute Al-Sc-Er-Zr alloys.*
Nhon Q. Vo, David. C. Dunand, David N. Seidman (to be submitted)
19. *Superior high-temperature creep strength of dilute Al-Sc-Er-Zr-Si alloys.*
Nhon Q. Vo, David. C. Dunand, David N. Seidman (to be submitted)
20. *High-temperature mechanical properties of aged-precipitate strengthened ferritic steel.*
Nhon Q. Vo, Michael Rawlings, David C. Dunand (to be submitted)

CONFERENCE PROCEEDING

1. *Laser compression of nanocrystalline metals.*
Marc A. Meyers, Hussam N Jarmakani, Eduardo M. Bringa, Paul Erhart, Bruce A. Remington,
Nhon Q. Vo, Yinmin M. Wang
AIP conference Proceedings. **1195** 1051-1056 (2009)

CONFERENCE PRESENTATIONS

1. *The Limits of Strength in Materials at the Nanoscale: A Quantitative Description of Plastic Deformation in Computer Generated Nano-crystalline Cu*
2008 Fall Meeting of the Materials Research Society, Boston, Dec. 1-5.

Nhon Q. Vo

2. *Forced chemical mixing in immiscible alloys during severe plastic deformation at elevated temperatures*
2009 Annual Meeting of the Minerals, Metals & Materials Society, San Francisco, Feb. 15–19.
3. *Yield strength in nanocrystalline Cu during high strain rate deformation*
2010 Annual Meeting of the Minerals, Metals & Materials Society, Seattle, Feb. 14–18.
4. *Forced atomic mixing of immiscible ternary alloys during severe plastic deformation*
2010 Annual Meeting of the Minerals, Metals & Materials Society, Seattle, Feb. 14–18.
5. *Microstructural stability of nanostructured Cu alloys during irradiation at very high-temperatures*
2010 Spring Meeting of the Materials Research Society, San Francisco, Apr. 5–9
6. *Morphology effect in severe plastic deformation*
2010 Fall Meeting of the Materials Research Society, Boston, Dec. 1–4
7. *Nanostructured alloys for extreme condition (Award presentation)*
2010 Fall Meeting of the Materials Research Society, Boston, Dec. 1–4
8. *Role of interface on chemical mixing of immiscible alloys under severe plastic deformation*
2011 Annual Meeting of the Minerals, Metals & Materials Society, San Diego, Feb. 27–Mar. 3
9. *Strength in nanocrystalline Cu: Role of grain boundary relaxation (Invited talk)*
2012 49th Annual Technical Meeting of the Society of Engineering Science
10. *Optimization of creep resistance in dilute Al-Sc-Er-Zr alloys*
2013 Annual Meeting of the Minerals, Metals & Materials Society, San Antonio, Mar. 3–7