

Zhexian Zhang, Ph.D

Date of Birth: 1987

Nationality: China

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Education

Ph.D. in Energy Science

Functional Energy Division– Conversion Materials Group
Kyoto University, Japan, 2013~2016

M.S. in Materials Science and Engineering

University of Science and Technology Beijing, China, 2010~2013

B.S. in Materials Science and Engineering (Material Physics)

University of Science and Technology Beijing, China, 2005~2009

Ph.D dissertation

Ion-irradiation hardening and microstructure evolution in Tungsten, 2016,

Supervisor: Akihiko Kimura, Kyoto University

Work experience

01/2019 to 06/2019, **Los Alamos National Laboratory**, Los Alamos, NM, USA,
Visitor- Material Science Division

06/2018 to 07/2018, **Pacific Northwest National Laboratory**, Richland, WA, USA,
Visitor- Nuclear Science Division

03/2018 to 03/2020, **University of New Mexico**, Albuquerque, NM, USA,
Post-doctoral Fellow– Department of Nuclear Engineering

06/2017 to 02/2018, **Kyoto University**, Uji, Kyoto, Japan,
Program-Specific Assistant Professor– Institute of Advanced Energy

04/2017 to 05/2017, **Kyoto University**, Uji, Kyoto, Japan,
Program-Specific Researcher – Institute of Advanced Energy

05/2016 to 04/2017, **Kyoto University**, Uji, Kyoto, Japan,
Researcher – Institute of Advanced Energy

Research topics

- (1) Irradiation hardening and aging embrittlement of FeCrAl ODS steels
- (2) Ion-irradiated polycrystal and single crystal W
- (3) Microstructure evolution in neutron irradiated MA956
- (4) Application of STEM dislocation contrast imaging
- (5) Swelling resistance and stability of ion-irradiated ARB nano-layer alloys

Award

- Young Researcher Award, for the presentation at 13th China-Japan Symposium on Materials for Advanced Energy Systems and Fission & Fusion Engineering, Sept. 2016
- Award of the 8th Japan Atomic Energy Society of Japan (AESJ) Materials Science and Technology Division, 2016
- Young Researcher Award, for the presentation at 12th Japan-China Symposium on Materials for Advanced Energy Systems and Fission & Fusion Engineering, Sept. 2014

Comments:

Areas of expertise

Nuclear materials, irradiation damage, material physics, advanced electron microscopy, material mechanics

Field of interests

- (1) Development of advanced cladding materials for GenIV fission reactors
- (2) Irradiation damage of plasma facing materials and divertor in fusion reactors
- (3) Irradiation induced phase segregation and precipitation kinetics
- (4) Advanced transmission electron microscopy techniques

Key techniques

TEM (diffraction contrast based, in-situ, HRTEM, EELS, EFTEM, STEM, CBED, HVTEM), EBSD, FIB, Nano-indentation

Other skills:

Microscopy: EPMA-WDS, AFM, XRD

Mechanical: Charpy, Multi-temperature Tensile tests,

Computational: Lammmps, FEM, Machine learning

Publications

- **Zhang Z**, Saleh TA, Maloy SA, Anderoglu O. Microstructure evolution in MA956 neutron irradiated in ATR at 328° C to 4.36 dpa. *Journal of Nuclear Materials*. 2020 Mar 10:152094. [link](#)
- D. Morrall, J. Gao, **Z.X. Zhang**, K. Yabuuchi, A. Kimura, T. Ishizaki, Y. Maruno, “Tensile properties of mechanically alloyed Zr added austenitic stainless steel”, *Nuclear Materials and Energy*, Vol.15(2018), 92-96. [link](#)
- Morrall D, Gao J, **Zhang Z**, Yabuuchi K, Kimura A, et al. Characterization of Precipitates in Mechanically Alloyed SUS304L Type Steel with Zirconium Addition. 2018 Int J Metall Met Phys 3:015.
- P. Song, D. Morrall, **Z.X. Zhang**, K. Yabuuchi, A. Kimura, “Radiation response of ODS ferritic steels with different oxide particles under ion-irradiation at 550 °C”, *Journal of Nuclear Materials*, Vol.502(2018), 76-85. [link](#)
- P. Song, **Z.X. Zhang**, K. Yabuuchi, A. Kimura, “Helium bubble formation behaviour in ODS ferritic steels with and without simultaneous addition of Al and Zr”, *Fusion Engineering and Design*, Vol.125(2017), 396-401. [link](#)

- E. Hasenhuetl, **Z.X. Zhang**, K. Yabuuchi, A. Kimura, “Effect of displacement damage level on the ion-irradiation affected zone evolution in W single crystals”, *Journal of Nuclear Materials*, Vol.495 (2017), 314-321. [link](#)
- E. Hasenhuetl, R. Kasada, **Z.X. Zhang**, K. Yabuuchi, A. Kimura, “Ion-irradiation effect on strain rate sensitivity of nanoindentation hardness of tungsten single crystal”, *Materials Transaction*, Vol.58 (2017) No. 4, 580-586. [link](#)
- E. Hasenhuetl, **Z.X. Zhang**, K. Yabuuchi, P. Song, A. Kimura, “Crystal orientation dependent ion-irradiation hardening behaviour in pure tungsten”, *Nuclear Instruments and Methods in Physics Research-B*, Vol.397(2017) 11-14. [link](#)
- E. Hasenhuetl, R. Kasada, **Z.X. Zhang**, K. Yabuuchi, Y-J. Huang, A. Kimura, “Evaluation of ion-irradiation hardening of tungsten single crystals by nanoindentation technique considering material pile-up effect”, *Materials Transactions*, Vol.58(2017) No.5, 749-756. [link](#)
- **Z.X. Zhang**, K. Yabuuchi, A. Kimura, “Defect distribution in ion-irradiated pure tungsten at different temperatures”, *Journal of Nuclear Materials*, 480(2016)207-215. [link](#)
- **Z.X. Zhang**, E. Hasenhuetl, K. Yabuuchi, A. Kimura, “Evaluation of helium effect on ion-irradiation hardening in pure tungsten by nano-indentation method”, *Nuclear Materials and Energy*, 9(2016) 539-546. [link](#)
- **Z.X. Zhang**, D.S. Chen, W.T. Han, A. Kimura, “Irradiation hardening in pure tungsten before and after recrystallization”, *Fusion Engineering and Design*, 98-99(2015) 2103-2107. [link](#)
- **Z.X. Zhang**, W.T. Han, A. Kimura, “Correlation of microstructure evolution and hardening in ion-irradiated pure tungsten”, *Journal of Plasma and Fusion Research Series*, 11(2015) 94-98.
- W.T. Han, A. Kimura, D.S. Chen, **Z.X. Zhang**, H. Serizawa, Y. Morisada, H. Fuji, “Parameter selection in dissimilar friction stir welding of ODS ferritic steel and RAFM steel F82H”, *Journal of Plasma and Fusion Research Series*, 11(2015) 65-68.

Publications (in submission):

- **Zhexian Zhang**, Daniel Morrall, Kiyohiro Yabuuchi, Akihiko Kimura, “475°C aging embrittlement of partially recrystallized FeCrAl-ODS steels after simulated tube processing”
- **Zhexian Zhang**, Siwei Chen, Kiyohiro Yabuuchi, Peng Dou, Akihiko Kimura, “Ion-irradiation hardening and microstructure evolution in FeCrAl ODS steels for ATF cladding”
- **Zhexian Zhang**, Eva Hasenhuetl, Kiyohiro Yabuuchi, Akihiko Kimura, “Three-dimensional self-ordered dislocation loop lattice structure in ion-irradiated tungsten”

International seminar (oral):

- 1) Z.X. Zhang, E. Hasenhuetl, K. Yabuuchi, A. Kimura, “3-dimensional self-ordering loop lattice in tungsten irradiated with iron ions”, The Nuclear Materials Conference, Montpellier, France, 2016.
- 2) Z.X. Zhang, E. Hasenhuetl, K. Yabuuchi, A. Kimura, “Microstructure stratification in pure tungsten after ion-irradiation at different temperatures”, the 13th China-Japan Symposium on Materials for Advanced Energy Systems and Fission and Fusion Engineering, Hefei, China, 2016.
- 3) Z.X. Zhang, K. Yabuuchi, A. Kimura, “Overview of defect distribution in polycrystalline tungsten after dual-beam irradiation”, 9th Pacific Rim International Conference on Advanced Materials and Processing, Kyoto, Japan, 2016.
- 4) Z.X. Zhang, K. Yabuuchi, A. Kimura, “Defect stratification and loop lattice in ion-irradiated W”, Japan-UK Seminar on Energy Materials&Science, Oxford, UK, February 2-26, 2016.

- 5) Z.X. Zhang, K. Yabuuchi, A. Kimura, “Effect of Helium on Irradiation Hardening and Microstructure Evolution in Pure Tungsten”, the 17th International Conference on Fusion Reactor Materials, Aachen, Germany, 2015.
- 6) Z.X. Zhang, W.T. Han, A. Kimura, “Correlation of microstructure evolution and hardening in ion-irradiation pure tungsten”, the 12th Japan-China Symposium on Materials for Advanced Energy Systems and Fission and Fusion Engineering, Shizuoka, Japan, 2014.

Japan annual meeting (oral):

- 7) Z.X. Zhang, S.W. Chen, J. Gao, P. Song, K. Yabuuchi, A. Kimura, “Ion-irradiation effects on FeCrAl-ODS ferritic steels”, Annual Autumn Meeting of Japan Institute of Metals and Materials, Sapporo, Japan, 2017.
- 8) Z.X. Zhang, A. Kimura, N. Oono, S. Ukai, “Effects of recrystallization on the aging embrittlement of FeCrAl-ODS ferritic steels”, Annual Spring Meeting of Japan Institute of Metals and Materials, Tokyo, Japan, 2017.
- 9) Z.X. Zhang, E. Hasenhuettl, Y-J. Huang, P. Song, D. Morrall, D. Kanai, K. Yabuuchi, A. Kimura, “Stratification of radiation damage structures in ion-irradiated tungsten”, Annual Autumn Meeting of Japan Institute of Metals and Materials, Osaka, Japan, 2016.
- 10) Z.X. Zhang, K. Yabuuchi, A. Kimura, “Damage structure of recrystallized tungsten ion-irradiated at 1000oC”, Annual Autumn Meeting of Japan Institute of Metals and Materials, Fukuoka, Japan, 2015.
- 11) Z.X. Zhang, K. Yabuuchi, A. Kimura, “Microstructure evolution in pure tungsten irradiated by Fe ions”, Annual Spring Meeting of Japan Institute of Metals and Materials, Tokyo, Japan, 2015.
- 12) Z.X. Zhang, E. Hasenhuettl, K. Yabuuchi, A. Kimura, “Microstructure evolution of pure tungsten under high temperature irradiation”, Annual Autumn Meeting of Japan Institute of Metals and Materials, Nagoya, Japan, 2014.
- 13) Z.X. Zhang, W.T. Han, A. Kimura, “Correlation of microstructure evolution and hardening in ion-irradiated pure tungsten”, Annual Meeting of Atomic Energy Society of Japan, Kyoto, 2014.
- 14) Z.X. Zhang, W.T. Han, A. Kimura, “Correlation between hardness and microstructure in pure tungsten”, Annual Spring Meeting of Japan Institute of Metals and Materials, Tokyo, Japan, 2014.

International seminar (poster):

- 1) Z.X. Zhang, M.R. M.M.H, N.A. Mara, M. Chauncey, Y.Q. Wang, O. Anderoglu “Irradiation resistance of ARB processed CuNb nanolayered composites at very high doses and temperatures”, TMS 148th Annual Meeting & Exhibition, San Antonio, Texas, USA, 2019.
- 2) Z.X. Zhang, K. Yabuuchi, J. Gao, P. Song, D. Morrall, N. Oono, S. Ukai, A. Kimura, “475°C-embrittlement of FeCrAl-ODS steels after simulated tube processing”, the 18th International Conference on Fusion Reactor Materials, Aomori, Japan, 2017.
- 3) Z.X. Zhang, E. Hasenhuettl, K. Yabuuchi, A. Kimura, “Defect stratification in ion-irradiated tungsten”, the 11th Fusion Energy Symposium, Fukuoka, Japan, 2016.
- 4) Z.X. Zhang, K. Yabuuchi, A. Kimura, “Irradiation hardening in pure tungsten before and after recrystallization”, the 28th Symposium on Fusion Technology, San Sebastian, Spain, 2014.
- 5) Z.X. Zhang, W.T. Han, A. Kimura, “Irradiation hardening in pure tungsten before and after recrystallization”, the 10th Fusion Energy Symposium, Tsukuba, Japan, 2014.