Zhexian Zhang, Ph.D

Date of Birth: 09/30/1987
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: Lammps, 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 Yabuuchi1, 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-dimentional 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. Hasenhuetl, 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. Hasenhuetl, 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. Hasenhuetl, 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.