TAKAAKI KOYANAGI

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Education:

Kyoto University, Japan	B.S.	2008	Engineering Science
Kyoto University, Japan	M.S.	2010	Energy Science
Kyoto University, Japan	Ph.D.	2013	Energy Science

Dissertation: Constitutive modelling of mechanical properties of neutron irradiated SiC fiber-reinforced SiC matrix composites

Research and Professional Experience:

January 2021–present — R&D staff, Materials Science & Technology Division, Oak Ridge National Laboratory, Oak Ridge, Tennessee

- Research focuses on the development and characterization of refractory materials and their composites for high-temperature and severe-environment applications. This emphasizes the effects of neutron irradiation on the mechanical properties and microstructure of ceramics and fiber reinforced composites, highlighting ceramics matric composites and high temperature materials for nuclear fusion and fission applications.
- Principal Investigator of US Department of Energy (DOE)–funded research projects, including ceramics material development in the fusion materials program and silicon carbide accident-tolerant fuel cladding development in the advanced fuel campaign

March 2016–January 2021 — Research Associate, Materials Science & Technology Division, Oak Ridge National Laboratory, Oak Ridge, Tennessee

July 2013–February 2016 — Postdoctoral fellow, Materials Science & Technology Division, Oak Ridge National Laboratory.

Performed research on the effects of neutron irradiation on mechanical properties and microstructure of silicon carbide-based ceramics and composites for nuclear fusion and fission applications. Development of joining technology for ceramics and composites; processing, mechanical testing, and non-destructive evaluation of joints. Trained radiological worker.

April 2013–June 2013 — Postdoctoral Research Fellow, Japan Society for the Promotion of Science, Kyoto University, Japan.

Research on development of prediction model for the strength of silicon carbide composites under neutron irradiation.

Selected publications: (full list: https://scholar.google.co.jp/citations?user=AI4JGiMAAAAJ&hl=ja)
28 authored and 60 co-authored peer-reviewed journal papers and conference proceedings as of May 2022, h-index: 26 (Google Scholar)

1. **Koyanagi, T.**, Sprouster, D. J., Snead, L. L., and Katoh, Y. (2021). X-ray characterization of anisotropic defect formation in SiC under irradiation with applied stress. *Scripta Materialia*, *197*, 113785. **selected as DOE office of Science highlight** (https://science.osti.gov/fes/Highlights/2021/FES-2021-11-a).

2. **Koyanagi, T.**, Terrani, K., Harrison, S., Liu, J., and Katoh, Y. (2021). Additive manufacturing of silicon carbide for nuclear applications. *Journal of Nuclear Materials*, *543*, 152577. **One of the most downloaded articles on the JNM website, as of March 2021. ORNL Fusion and Fission Energy and Science Directorate research highlight** (https://www.ornl.gov/organization-news/future-fusion-reactors-could-be-built-3d-printed-ceramics).

3. **Koyanagi, T.**, Katoh, Y., Ang, C., King, D., Hilmas, G. E., and Fahrenholtz, W. G. (2019). Response of isotopically tailored titanium diboride to neutron irradiation. *Journal of the American Ceramic Society*, *102*(1), 85-89., **selected as DOE office of Science highlight** (https://www.energy.gov/science/fes/articles/investigating-materials-can-go-distance-fusion-reactors)

4. **Koyanagi, T.**, Katoh, Y., Nozawa, T., Snead, L. L., Kondo, S., Henager Jr, C. H., Ferraris, M., Hinoki, T., and Huang, Q. (2018). Recent progress in the development of SiC composites for nuclear fusion applications. *Journal of Nuclear Materials*, *511*, 544-555. **One of the most cited articles on the JNM website, as of February 2021**

5. **Koyanagi, T.**, Katoh, Y., and Lance, M. J. (2018). Raman spectroscopy of neutron irradiated silicon carbide: Correlation among Raman spectra, swelling, and irradiation temperature. *Journal of Raman Spectroscopy*, *49*(10), 1686-1692., **selected as the journal cover.**

6. **Koyanagi, T.**, Kumar, N. K., Hwang, T., Garrison, L. M., Hu, X., Snead, L. L., and Katoh, Y. (2017). Microstructural evolution of pure tungsten neutron irradiated with a mixed energy spectrum. *Journal of Nuclear Materials*, *490*, 66-74. **One of the most cited articles on the JNM website, as of June 2020**

7. **Koyanagi, T.**, Wang, H., Karakoc, O., and Katoh, Y. (2022). Mechanisms of stored energy release in silicon carbide materials neutron-irradiated at elevated temperatures. *Materials & Design*, 110413.

8. **Koyanagi, T.**, Katoh, Y., Hinoki, T., Henager, C., Ferraris, M., and Grasso, S. (2020). Progress in development of SiC-based joints resistant to neutron irradiation. *Journal of the European Ceramic Society*, *40*(4), 1023-1034

9. **Koyanagi, T.**, Nozawa, T., Katoh, Y., and Snead, L. L. (2018). Mechanical property degradation of high crystalline SiC fiber–reinforced SiC matrix composite neutron irradiated to∼ 100 displacements per atom. *Journal of the European Ceramic Society*, *38*(4), 1087-1094.

10. **Koyanagi, T.**, Lance, M. J., and Katoh, Y. (2016). Quantification of irradiation defects in beta-silicon carbide using Raman spectroscopy. *Scripta Materialia*, *125*, 58-62.

Representative invited papers at international conferences and symposium:

1. **T. Koyanagi**, K. Terrani, S. Harrison, J. Liu, and Y. Katoh, "Additive manufacturing of silicon carbide for nuclear applications", **Invited plenary talk**, GIMRT-REMAS2020 Oarai Workshop & Radiation Effects in Materials: Irradiation 3.0 Workshop, Virtual conference, September 30-October

1 2020.

2. **T. Koyanagi**, Y. Katoh, Y. Yang, B. Jolly, R. Lowden, C. Ang, J. Kabel, P. Hosemann, T. Nozawa, and L.L. Snead, "Design and strategy for next generation SiC composites for fusion energy", Invited talk, 19th International Conference on Fusion Reactor Materials, La Jolla, California, November 2019

3. **T. Koyanagi**, Y. Katoh, G. Singh, C. Petrie, C. Deck, and K. Terrani, "Post-irradiation examination of SiC tubes neutron irradiated under a radial high heat flux", Invited talk, 42nd International Conference and Exposition on Advanced Ceramics and Composites, Florida, January 2018

4. **T. Koyanagi**, Y. Katoh, T. Nozawa, L.L. Snead, T. Hinoki, S. Kondo, C.H. Henager Jr., M. Ferraris, and Q. Huang, "Recent progress in the development of SiC composites for fusion", **Invited plenary talk**, 18th International Conference on Fusion Reactor Materials, Aomori, Japan, November 2017

5. **T. Koyanagi**, Y. Katoh, L. Snead, C. Shih, T. Hinoki, M. Fukuda, K. Shimoda, S. Kondo, and K. Ozawa, A. Hasegawa, "Irradiation creep behavior of silicon carbide materials beyond the initial transient", Invited talk, 16th International Conference on Fusion Reactor Materials, Beijing, China, October 2013

Honors

- Global Star Award, Engineering Ceramics Division, American Ceramics Society, 2020 International Conference on Advanced Ceramics and Composites.

Society and scholarly involvements:

- Member: American Ceramic Society, American Nuclear Society, and The Minerals, Metals, and Materials Society

- **Lead organizer**, "Development and Applications of Advanced Ceramics and Composites for Nuclear Fission and Fusion Energy Systems" symposium at International Conference & Exposition on Advanced Ceramics and Composites, 2019–present.

- Co-organizer, "Joining and Integration issues" symposium at 10th International Conference on High Temperature Ceramic-Matrix Composites, September 22–26, 2019, Bordeaux, France

- Co-organizer, "Development and Applications of Advanced Ceramics and Composites for Nuclear Fission and Fusion Energy Systems" symposium at International Conference & Exposition on Advanced Ceramics and Composites, January 21–36, 2018, Daytona Beach, FL

- Review activities: 103 verified Journal reviews (https://publons.com/researcher/1465070/takaaki-koyanagi/) since 2018.

- Brookhaven National Laboratory, National Synchrotron Light Source II (NSLS-II) High Energy Diffraction Proposal Review Panel (PRP), 2021–present.

- Proposal reviews for US DOE Office of Science, Small Business Innovation Research on ceramics material development