

Jiayu Sun

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Ph.D., Institute for Materials Research (IMR), Tohoku University, Japan
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Personal page: [Website](#), [Linkedin](#), [Googlescholar](#), [Researchgate](#), [Scopus](#), [Orcid](#)
Specialty in: Metal additive manufacturing (DED, SLM, EBM), Cold spray, PVD,
CFRP composite, CFRP metallization,
Numerical analyses (Abaqus, Flow3D, ANSYS, COMSOL),
Machine learning, Deeping learning.



Current position

Postdoctoral researcher – Institute for Materials Research (IMR), Tohoku University (Japan) 04/2022 – present

Education

Doctor – Tohoku University (Japan), Institute for Materials Research (IMR) 04/2019 – 04/2022
Materials Science, Supervisor: Prof. Ahikiho Chiba
Research student – Tohoku University (Japan), Institute for Materials Research (IMR) 10/2018 – 04/2019
Materials Science, Supervisor: Prof. Ahikiho Chiba
Master – Northeastern University (China) 09/2015 – 02/2018
Mechanical Engineering, Supervisor: Prof. Tianbiao Yu
Bachelor – Lanzhou Jiaotong University (China) 09/2011 – 06/2015
Vehicle Engineering

Skills

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1. Language: Mandarin (Native), English (Proficient), Japanese (fluent).
 2. CAE: AutoCAD, Inventor, SolidWorks, UG.
 3. Image processing: Adobe Photoshop, Adobe Illustrator, Inkscape, Affinity Designer.
 4. Data processing: R, Origin, Graphpad Prism.
 5. Experiment designer: JMP, SPSS.
 6. FEM simulation: Abaqus, Hyperworks.
 7. CFD simulation: ANSYS, FLOW3D.
 8. Molecular dynamics: Materials studio, Lammps.
 9. First – principles calculation: CP2K.
 10. Programming: R, Python, Matlab.
 11. Crystallographic analyses: MTEX, AZtec.
 12. Materials characterization skills: OM, SEM, EDAX, EMPA, XRD, EBSD, TEM, FIB, XCT, XPS, DSC, TAG, Vickers hardness tester, Nanoindentation tester.

Academic experiences

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1. **SAKURA science exchange program** 01/2017 – 01/2017
Japan-Asia youth exchange program to Kumamoto University
 2. **Co-founder, Art design, and Social Media of ResearchIC community** 08/2021 – present
A community to aggregate collective intelligence for research students, scientists, professors and the public. Official website and social media: [ResearchIC](#), [Linkedin](#), [Reddit](#), [Twitter](#).

Project experiences

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1. **Collaboration project with Rrof. Farhad REZAI-ARIA (Institut Clément Adér chez Ecole** 06/2022 – 06/2023

des Mines Albi Carmaux) on the topic of Ti₆Al₄V by Selective laser melting (SLM)

Characterization of microstructure evolution of Ti₆Al₄V manufactured by Selective laser melting (SLM) before/after high-temperature tensile test.

2. Collaboration project with Prof. Tsai Meng Hsiu (National Kaohsiung University of Science and Technology) on the topic of AlCoCrMoNbNiW HEA by Selective laser melting (SLM) 07/2022 – 07/2023

Characterization of microstructure evolution of AlCoCrMoNbNiW HEA manufactured by Selective laser melting (SLM).

3. Development of High-Strength, High-Speed Joining and Assembly Technology for Composite Components and Metals in Aircraft Parts 04/2022 – 04/2023

Development of the improvement method of Sn coating/CFRP joint by mechanical methods and chemical methods.

- a. Creation of a new processing method.
- b. Mechanical methods (two-step methods)
- c. Chemical methods (Silane coupling agents)
- d. Revelation of the bonding mechanism and delamination behavior.

4. Collaboration project with Toyota Corporation. 04/2022 – 04/2023

Development of TiB₂-dispersed High Modulus Steels by Electron beam melting (EBM) Additive Manufacturing

- a. To investigate whether additive manufacturing without defects is possible.
- b. To investigate the effects of using PBF-EB on the microstructure of TiB₂-HMS.
- c. To investigate whether PREP can make the spherical powder of TiB₂-HMS.
- d. To investigate what happens when the PREP powder is irradiated by EB.

5. New Energy and Industrial Technology Development Organization (NEDO) Feasibility Study Program 04/2019 – 04/2022

Multi-material 3D joining and optimum molding technology for higher reliability than the current joining in the aviation field

- a. Fabrication of the metal coating on the CFRP composite materials;
- b. Use the cold spray method to analyze and compile data systematically.

6. Opening Project of Jiangsu Key Laboratory of Advanced Structural Materials and Application Technology. 01/2021 – 12/2022

- a. Development of the ceramics thermal barrier coating on C/C composite materials by thermal spray
- b. Exploration of the oxidation mechanism and improving the oxidation resistance of Sprayed coating at high temperature

7. Key Technology and Application Demonstration of Machine Tool Green Remanufacturing 08/2017 – 12/2019

Key Technologies and Application Demonstration of Laser Green Remanufacturing

- a. Green remanufacturing of machine tool parts through additive manufacturing;
- b. Development and mining of new materials and processes; Optimization of processing parameters

8. Research on Key Technologies of Optimal Design and Rapid Manufacturing of Complex Special-shaped Parts Based on Additive Manufacturing Technology 01/2015 – 12/2017

Laser engineered net shaping 3d printer development

- a. Development of additive manufacturing device;
- b. Verification and improvement of the device and optimize the processing parameters.

Publications

1. **Jiayu, S.**, Kenta, Y., Shaoyun, Z., et al. Dynamic recrystallization of Sn coatings on carbon-fiber-reinforced plastics during cold spray additive manufacturing. *Addit. Manuf.* **6**, 102949 (2022).
2. Hao L., Yangyang L., Wenping L., Qiang M., Shaoyun Z., **Jiayu S.** Effect of the Y₂O₃ amount on the oxidation

- behavior of ZrB₂-SiC-based coatings for carbon/carbon composites. *J. Eur. Ceram. Soc.* **5** (2022).
3. **Jiayu, S.**, Kenta, Y., Shaoyun, Z., et al. Adhesion mechanism of Sn coatings on the carbon fiber reinforced plastics using cold spray technique. *Appl. Surf. Sci.* **579**, 151873 (2022).
 4. Yu, Z., Liaoyuan, C., **Jiayu, S.**, et al. Microstructure evolution and wear resistance of in-situ synthesized (Ti, Nb)C ceramic reinforced Ni₂₀₄ composite coatings. *Ceram. Int.* **11**, 17518-17528 (2022).
 5. **Jiayu, S.**, Shaoyun, Z., Kenta, Y., et al. Thermal Effects in Sn Coating on a Carbon Fiber Reinforced Plastic by Cold Spraying. *J. Therm. Spray Tech.* **30**, 1254 – 1261 (2021).
 6. **Jiayu, S.**, Shaoyun, Z., Kenta, Y., et al. Cold Spray Sn Coating on the Carbon Fiber Reinforced Polymer. *Proceedings of the ITSC2021. Thermal Spray 2021: Proceedings from the International Thermal Spray Conference.* 75 – 78 (2021).
 7. Yu, Z., Lin, Y., **Jiayu, S.**, et al. Mechanical property of YCF101 coating under different overlap modes by laser cladding. *Optik.* **212**, 164714 (2020).
 8. Yu, Z., Chuang, G., Liaoyuan C., **Jiayu, S.**, Yu T. Effect of process parameters on the cladding track geometry fabricated by laser cladding. *Optik – Int. J. Light and Electron Optics.* **223**, 165447 (2020).
 9. **Jiayu, S.**, Yu, Z., Lin, Y., et al. Process optimization for improving topography quality and manufacturing accuracy of thin-walled cylinder direct laser fabrication. *Int. J. Adv. Manuf. Technol.* **105**, 2087 – 2101, (2019).
 10. **Jiayu, S.**, Shaoyun, Z., Kenta, Y. et al. Adhesion mechanism of temperature effects on Sn coating on the carbon fiber reinforced polymer substrate by cold spray. *arXiv:2010.10988*.
 11. Yu, Z., Tianbiao, Y., **Jiayu, S.**, et al. Microstructure and properties of laser clad B₄C/TiC/Ni – based composite coating. *Int. J. Refract. Met. Hard Mater.* **86**, 105112 (2019).
 12. Yu, Z., Yu T., Chuang, G., **Jiayu, S.**, et al. Microstructure and friction coefficient of ceramic (TiC, TiN and B₄C) reinforced Ni-based coating by laser cladding. *Ceram. Int.* **45**, 20824 – 20836 (2019).
 13. Tianbiao, Y., Zhang, T., Yu, X., Yang, X., **Jiayu, S.**, Study on optimization of ultrasonic-vibration-assisted polishing process parameters. *Measurement.* **135**, 651 – 660 (2019).
 14. Tianbiao, Y., Zhang, T., Liaoyuan C., Yu T., **Jiayu, S.**, Guan C. Microstructure and mechanical properties of Ti–C–TiN–reinforced Ni₂₀₄–based laser–cladding composite coating. *Ceram. Int.* **47**, 5918 – 5928 (2019).
 15. **Jiayu, S.**, Tianbiao, Y., Yu, Z., et al. Research on Laser Cladding Forming Process of Circumferentially Inclined Thin-Walled Cylinders. *Chinese Journal of Lasers.* **45**, 0802004, (2018).
 16. Tianbiao, Y., **Jiayu, S.**, Wanrui, Q., et al. Influences of z – axis increment and analyses of defects of AISI 316L stainless steel hollow thin – walled cylinder. *Int. J. Adv. Manuf. Technol.* **97**, 2203 – 2220 (2018).
 17. Yu, Z., Tianbiao, Y., **Jiayu, S.**, et al. Effect of laser cladding on forming qualities of YCF101 alloy powder in the different lap joint modes. *Int. J. Adv. Manuf. Technol.* **96**, 1991 – 2001 (2018).
 18. Tianbiao, Y., Yu, Z., **Jiayu, S.**, et al. Process parameters optimization and mechanical properties of forming parts by direct laser fabrication of YCF101 alloy. *J. Mater. Process. Technol.* **262**, 75 – 84 (2018).
 19. Tianbiao, Y., Lin, Y., Yu, Z., **Jiayu, S.**, et al. Experimental research and multi – response multi – parameter optimization of laser cladding Fe313. *Opt. Laser Technol.* **108**, 321 – 332 (2018).
 20. Yu T, Yang L, Zhao Y, **Jiayu, S.**, et al. Experimental research and multi – response multi – parameter optimization of laser cladding Fe313. *Optics & Laser Tech.* **108**, 321 – 332 (2018).
 21. Lin, Y., Tianbiao, Y., Ming, L., Yu, Z., **Jiayu, S.**, Microstructure and wear resistance of in – situ synthesized Ti(C, N) ceramic reinforced Fe–based coating by laser cladding. *Ceram. Int.* **44**, 22538 – 22548 (2018).
 22. Tianbiao, Y., **Jiayu, S.**, Hang, W., et al. Parameter selection of laser cladding TC11 titanium alloy simulated by temperature field. *Laser & Infrared.* **47**, 284 – 290, (2017).
 23. **Jiayu, S.**, Yu, Z., Lin, Y., et al. Effect of shielding gas flow rate on cladding quality of direct laser fabrication AISI 316L stainless steel. *J. Manuf. Processes.* **48**, 51 – 65 (2015).

Talks

1. **Jiayu, S.**, Kenta, Y., Kazuhiro, O., et al. Recrystallization behavior of Sn coating on carbon fiber reinforced plastics during cold spraying. 2022 Cold Spray Action Team Meetings, Massachusetts, USA, 2022.
2. **Jiayu, S.**, Kenta, Y., Kazuhiro, O., et al. The 5th International Union of Materials Research Societies International Conference of Young Researchers on Advanced Materials. (IUMRS-ICYRAM 2022), Fukuoka, Japan, 2022.
3. **Jiayu, S.**, Kenta, Y., Kazuhiro, O., et al. 115th Japanese Thermal Spray Conference, 溶射学会春期講演大会, Japan, 2022.

4. **Jiayu, S.**, Kenta, Y., Zhou S., et al. Temperature effects of metallization of carbon fiber reinforced plastics by cold spray. *Advances in Surfaces, Interfaces and Interphases 2022*, 2022. (Poster)
5. **Jiayu, S.** Falling walls lab Sendai, Tohoku University, Sendai, 2022.
6. **Jiayu, S.**, Kenta, Y., Kazuhiro, O., et al. Dynamic recrystallization of Sn coating on carbon fiber reinforced plastic during multipass cold spraying. The Japan Institute of Metals and Materials, 金属学会春期講演大会, Japan, 2022.
7. **Jiayu, S.**, Kenta, Y., Chiba, A., et al. Temperature effects of metallization of carbon fiber reinforced plastics by cold spray technique. *Materials Science 2022 & GIMRT User Meeting 2022*, Sendai, Japan, 2022. (Poster)
8. **Jiayu, S.**, Kenta, Y., Chiba, A., et al. Cold spray Sn coating on carbon fiber reinforced plastics. *International thermal spray conference and exposition*. Quebec City, Canada, 2021.
9. **Jiayu, S.**, Kenta, Y., Chiba, A., et al. Whisker generation on cold sprayed Sn coating on CFRP. The Japan Institute of Metals and Materials, 金属学会春期講演大会, Japan, 2021.
10. **Jiayu, S.**, Kenta, Y., Chiba, A. Epoxy fracture behavior in the metalized CFRP by cold spray. *2nd International Workshop on Plasticity, Damage, and Fracture of Engineering Materials*, Ankara, Turkey, 2021.
11. **Jiayu, S.**, Kenta, Y., Chiba, A., et al. Temperature Effect on Deposition Behaviors of Multilayer Tin Coating on Carbon Fiber Reinforced Polymer. *The 10th Asian Thermal Spray Conference*, Ningbo, China, 2020.
12. **Jiayu, S.**, Kenta, Y., Chiba, A., et al. Cold spray Sn coating on the carbon fiber reinforced polymer. *111th Japanese Thermal Spray Conference*, 溶射学会春期講演大会, Japan, 2020.
13. **Jiayu, S.**, Kenta, Y., Chiba, A., et al. Analysis of the operating window of cold spray Titanium onto the CFRP, *SMS2019 & GIMRT User Meeting 2019*, Sendai, Japan, 2019. (Poster)

Patents

1. A Wireless Charging AA Battery, patent application number: 201610844482.8.
2. A drying device for laser cladding powder, patent application number: 201710067041.6.
3. A kind of complex supporting rib vascular stent, patent application number: 201710448646.X.
4. A laser cladding 316L stainless steel optimization process, patent application number: 201710483509.X.
5. An operating platform device for laser cladding, patent application number: 201710073715.3.
6. A laser cladding adjustment and alignment device, patent application number: 201710050555.0.
7. A drying device for laser cladding powder, utility model patent certificate number: 6438167.
8. An operating platform device for laser cladding, utility model patent certificate number: 6388100.
9. A light adjustment device for laser cladding, utility model patent certificate number: 6471767.

Scholarships

1. 04/2021 Aoba Engineering Promotion Association Scholarship (1 year)
2. 04/2019 Amano Research Institute of Technology Scholarship (3 years)
3. 12/2016 National Scholarship for Master Degree
4. 09/2016 First prize of Northeastern University Postgraduate Scholarship
5. 09/2015 First prize of Northeastern University Postgraduate Scholarship
6. 12/2014 National Inspirational Scholarship
7. 10/2013 First prize of Lanzhou Jiaotong University Scholarship
8. 11/2012 First prize of Lanzhou Jiaotong University Scholarship

Funds & Grants

1. 04/2022 – 04/2023 2022 Research Grant of Japan Thermal Spray Society (¥600,000). Funding for Project 5.

Honors

1. 09/2019 National Innovation Institute of Additive Manufacturing (NIIAM) Excellence Award The 2019 International 3D Printing & Design Competition
2. 01/2018 Outstanding Graduate Students of Northeastern University
3. 09/2017 Outstanding Students in Shenyang City
4. 04/2017, 04/2018 National College Student Energy Conservation and Emission Reduction Social Practice and

- Science and Technology Competition (Twice)
5. 01/2017 National Second Prize of the 10th China Graduate Electronics Design Competition
 6. 11/2016 Third national prize of the 10th China Graduate Electronics Design Competition Business Plan Special Competition
 7. 12/2016 Provincial Silver Award in the 2nd China "Internet +" University Student Innovation and Entrepreneurship Competition
 8. 08/2016 National second prize of the National Graduate Mobile Terminal Application Design Innovation Competition
 9. 05/2016 National Excellence Award of ABB University Student Innovation Competition
 10. 04/2016 Provincial second prize of the 2016 "Creating Youth" National College Student Entrepreneurship Competition

Organizations & Services

1. Regular member of the Japan Thermal Spray Society (日本溶射学会).
2. Regular Foreign member of the Japan Institute of Metals and Materials (日本金属学会).
3. Regular member of the Japan Society for Composite Materials (日本複合材料学会).
4. Student member of the Institute of Materials, Minerals and Mining (IOM3).
5. Member of American Society for Metals (ASM International).
6. Peer reviewer for Journal of Thermal Spray Technology (IF = 2.757), Composites Part B (IF = 9.078), Journal of Materials Research and Technology (IF = 5.039), Soft Computing (IF = 3.643), and Canadian Metallurgical Quarterly (IF = 2.3), Optics and Laser Technology (IF = 3.867), Crystals (IF = 2.670), Advances in Applied Ceramics Structural, Functional and Bioceramics (IF = 2.475)

Activities

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| <p>1. Innovation and Entrepreneurship Association</p> <p>Director of Propaganda Department</p> <ol style="list-style-type: none"> a. Conducted campus activities, assigned tasks for association members. b. Responsible for the promotion and planning of the event. | <p>09/2011 – 01/2015</p> |
| <p>2. Student Union</p> <p>Director of Technology Department</p> <ol style="list-style-type: none"> a. Constituted the themes of student union activities, organized publicity campaigns. b. Assistance other commissaries to complete daily administration of class. c. In charge of the push of the WeChat public account of the School of Mechanical Engineering. | <p>09/2015 – 01/2018</p> |
| <p>3. Basketball Team</p> <p>Team Member</p> <ol style="list-style-type: none"> a. Took part in training and competition regularly. b. Assisted in the selection of new members and training. | <p>09/2016 – 04/2017</p> |

Volunteering

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|---|---------------------------------|
| <p>1. 2016 International Conference on Frontiers of Design and Manufacturing</p> <p>Director of the Network Department</p> <ol style="list-style-type: none"> a. Responsible for the publication and updating of information on the conference profile, conference venue guide, venue layout, and planning in the WeChat public platform. b. Responsible for the venue set-up. c. Responsible for the data and information synchronization of the official website. | <p>08/2016 – 09/2016</p> |
| <p>2. Young Volunteers Association</p> | <p>09/2016 – 06/2017</p> |

- a. Joined in volunteer activities, such as Aid – education;
- b. Participated in voluntary activities promotion and volunteer recruitment.

Internships

In purchasing & parts quality management at BMW Brilliance Automotive Ltd

06/2016 – 12/2016

Interests

Camping, Fish casting, Skiing, Fitness. Darts