FY2025 Researcher Exchange Program for Future Global Leaders Kick-off Meeting

Monday, June 2, 2025, 15:00-16:30
SAKIGAKE Club Space
-Hybrid format- (Co-Creation Innovation Bldg. 6F)

15:00 (5min) Opening remarks by EVP Onoye
15:05 (20min) Research presentation (3-5 minutes/person)
15:25 (20min) Q&A session
15:45 (40min) Free discussion time
16:25 Closing remarks by EVP Miyamoto

No.	Researcher	Affiliation	Destination
1	YAMAMURA Shisato <Online>	Engineering (D2)	University of Oxford
2	NUNOTA Kansuke	Science (D2)	NASA Goddard Space Flight Center
3	UEDA Yuika	Engineering Science (D2)	University College London
4	Jeff HUANG	Joining and Welding Research Institute (Specially Appointed Researcher)	Macquarie University
5	NAITO Masahiro <Absence>	Humanities (D1)	King's College London

Researcher Exchange Program for Future Global Leaders

The University of Osaka Foundation for the Future (Research and other support business fund) supports early-career researchers, such as postdocs and doctoral students, to gain international research experience, fostering future leaders in academic research.

ATTENDEES

- Trustees -
- ONOYE Takao / Executive Vice President for Research
- MIYAMOTO Yoichi / Executive Vice President for Global Education
- HAYASHI Mikako / Executive Vice President for Global Engagement

- Overseas Centers, Institute for International Initiatives -
- MATSUNO Kenji / Director, European Center for Academic Initiatives

- University Research Board -
- KATO Kazuto / Professor, Graduate School of Medicine

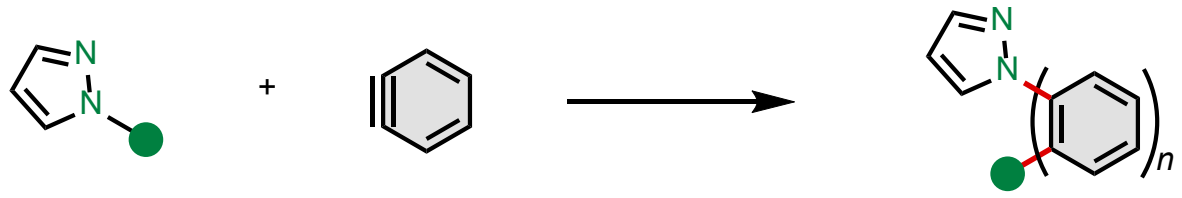
- Office of Management and Planning -
- TAKANO Makoto / Senior Research Manager
- OKAMOTO Noriko / Research Manager

- Department of Research Promotion -

次世代グローバルリーダー海外派遣プログラム

Tobisu Group, Department of Applied Chemistry, Graduate School of Engineering,
D2 Shisato Yamamura

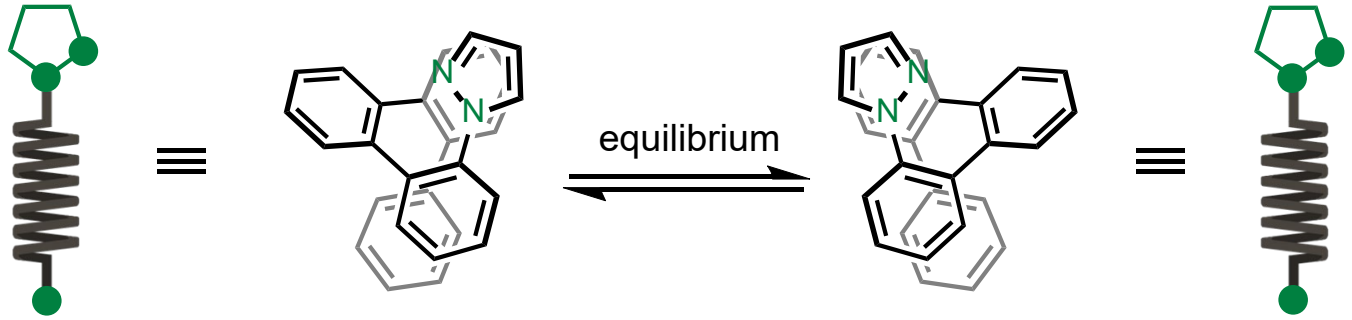
Our Work: Pyrazole Initiated Polymerization of Benzynes



Pyrazole　　Benzyne　　Polyorthophenylene (POP)

J. Am. Chem. Soc. 2025, *in pess*

Structure

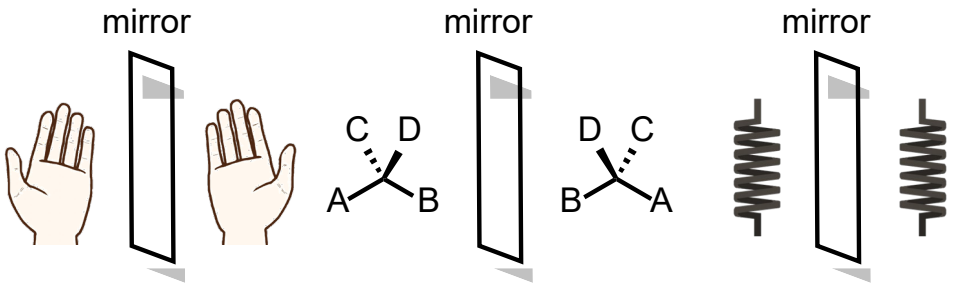


(*M*)-helix
Right-handed helix

(*P*)-helix
Left-handed helix

Research Theme: Chiral Switching-Based Asymmetric Synthesis Using an Achiral Helical Catalyst and a Natural Chiral Solvent

Host Institution: Darren Dixon group, Department of Chemistry, University of Oxford



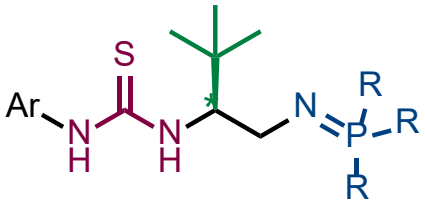
Normal Synthesis

□Right-handed: Left-handed = 1 : 1

Assymmetric Synthesis

□Right or Left-handed only

□Essential for Drug Synthesis



Original Assymmetric Catalyst in Dixon group (BIMP)
Dixon et al. *Acc. Chem. Res*. 2020, *53*, 2235.

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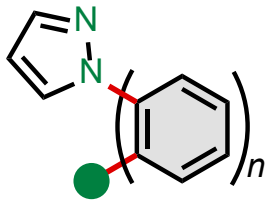
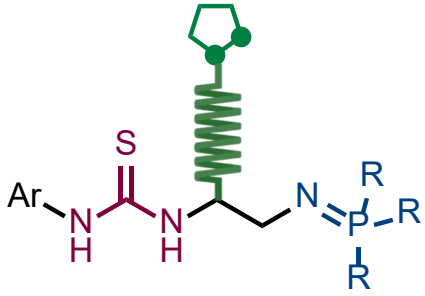


Polyorthophenylene (POP)
J. Am. Chem. Soc. 2025, *in pess*



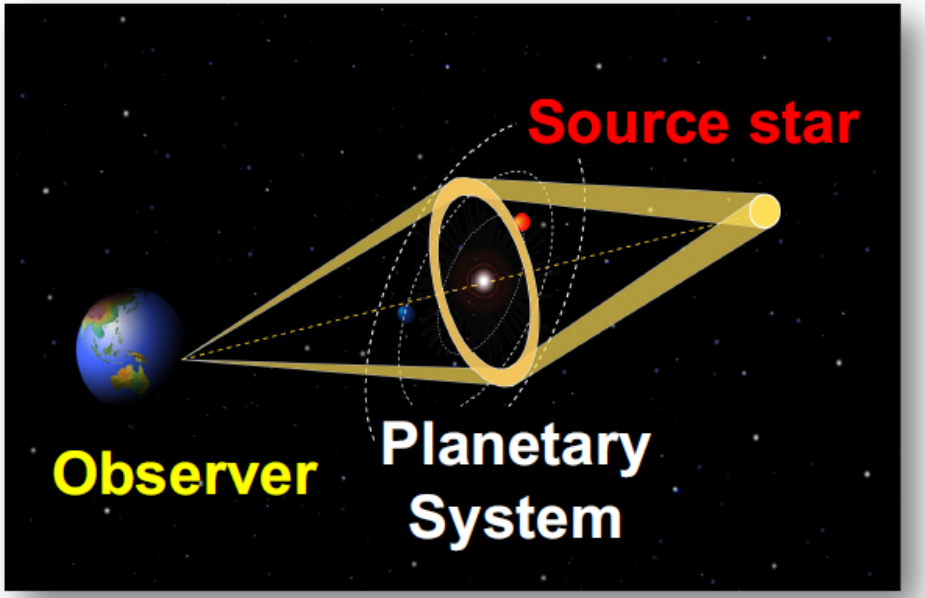
POP-BIMP catalyst

Exoplanet …A planet that orbits a star outside our solar system.
(太陽系外惑星)

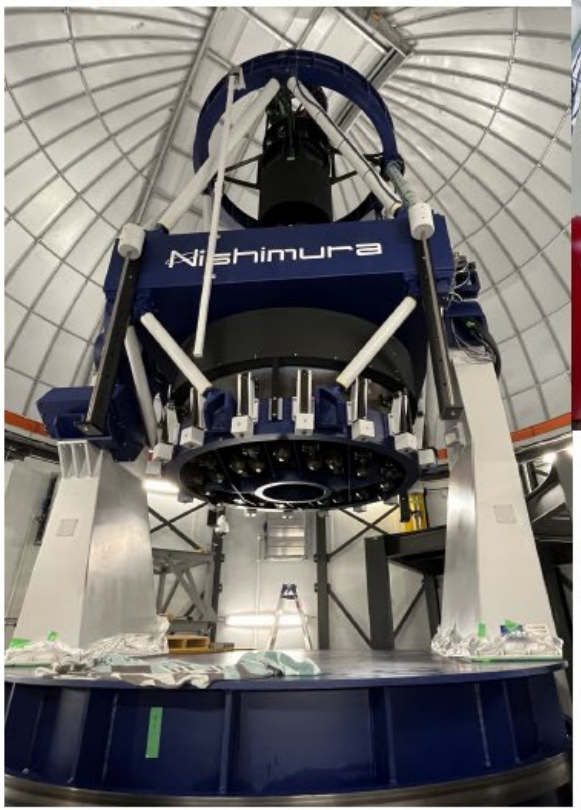
https://ja.wikipedia.org/wiki/太陽系外惑星

Gravitational Microlensing
(重力マイクロレンズ)

… method for discovering exoplanets



PRIME telescope
@ South Africa



MOA telescope
@ New Zealand

Milkey Way from South Africa

National Animal in SA

What's Next

Goddard Space Flight Center

Subaru Telescope (すばる望遠鏡)

Free Floating Planet (自由浮遊惑星)

… A planet drifting through space without a host star.

Yuika Ueda

Graduate School of Engineering Science
Department of Mechanical Science and Bioengineering
Deguchi lab. D2

Mechanobiology × Systems biology

Intra/Extracellular mechanical stress

↓

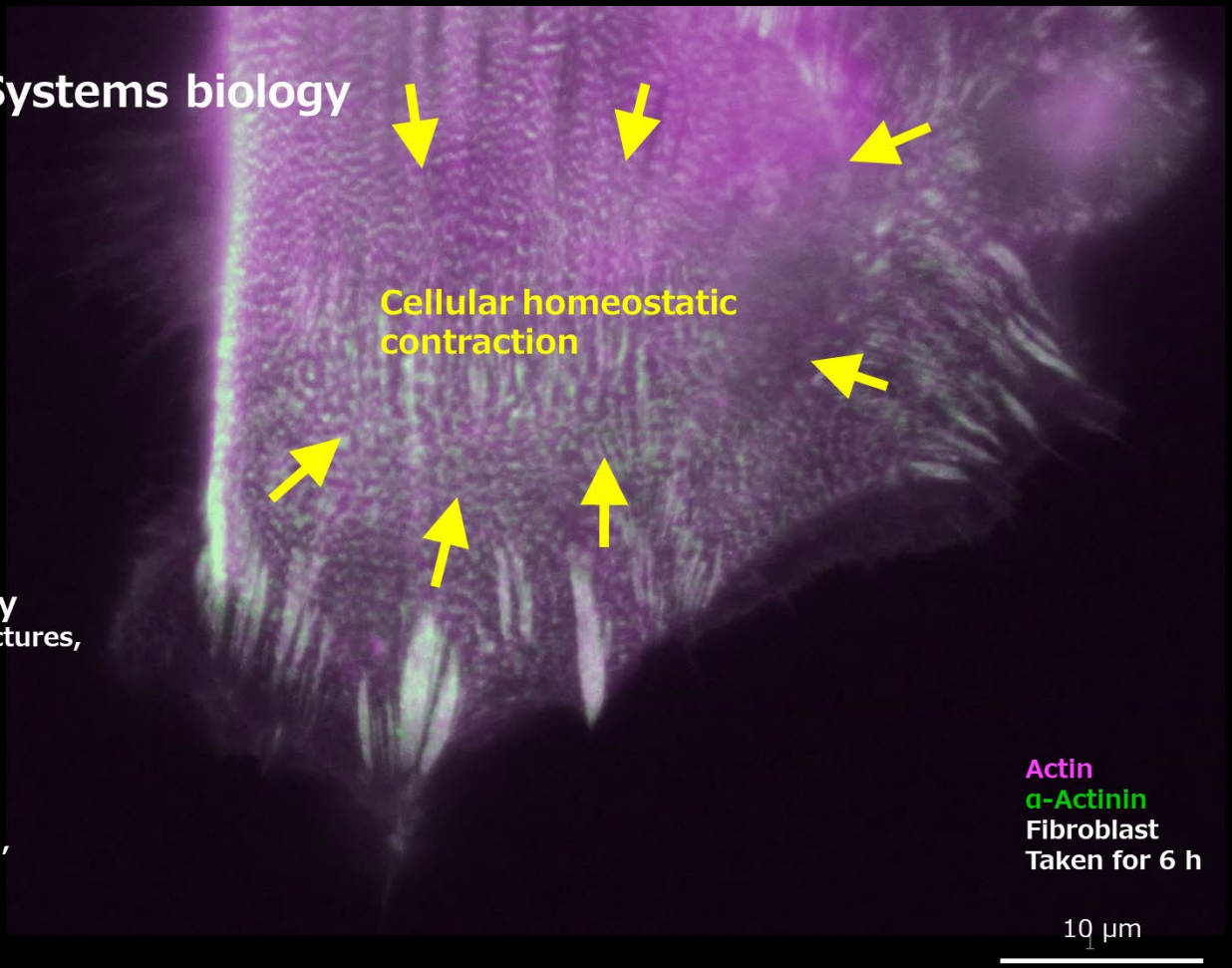
Cell system
Mechanotransduction

↓

Mechanical adaptability
Stability of Signals, Internal structures, Shape, and Stiffness etc.

↓

Cellular condition
Differentiation, Proliferation, and Apoptosis etc.



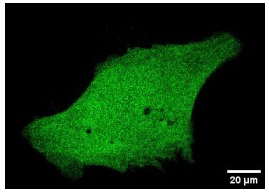
Yuika Ueda

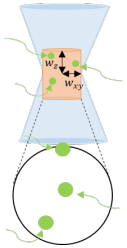
Graduate School of Engineering Science
Department of Mechanical Science and Bioengineering
Deguchi lab. D2

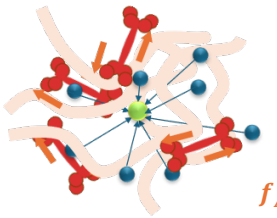
MY PAGE

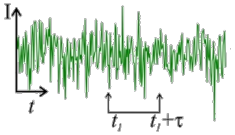
What are mechanical properties?

FCS measurement and Nonequilibrium









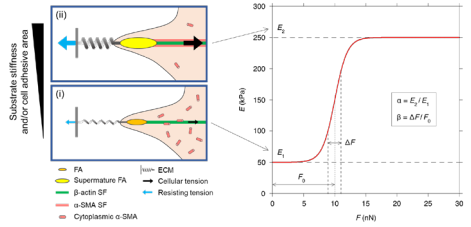
$$f_A = \frac{l}{D\tau_B}\left(\frac{D}{\mu} - k_B T\right)$$

thermal force
nonthermal force

Ueda et al., *arXiv preprint,* 2024

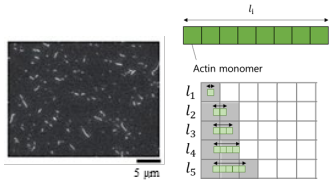
How is the cellular mechanical phenomenon achieved?

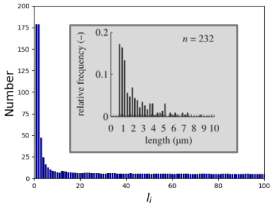
Multiple set-points of cellular homeostatic tension



Ueda et al., *Journal of Biomechanics,* 2023

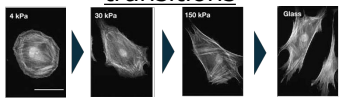
Statistical rules for cytoskeletal components

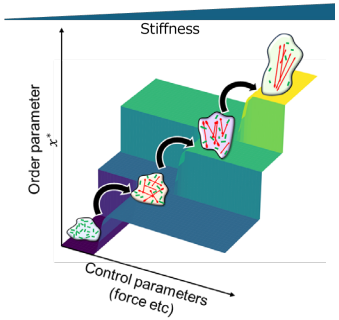




Ueda et al., *Scientific Reports*, 2022

Stepwise phase transitions

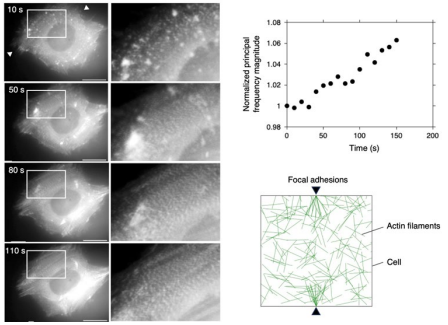




Ueda et al., *arXiv preprint,* 2024

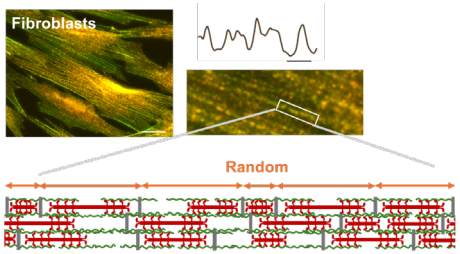
Why do cells have unique mechanical properties?

Subcellular structures by percolation analysis



Ueda et al., *Integrative Biology,* 2024

Adaptive flexibility of cytoskeletal structures



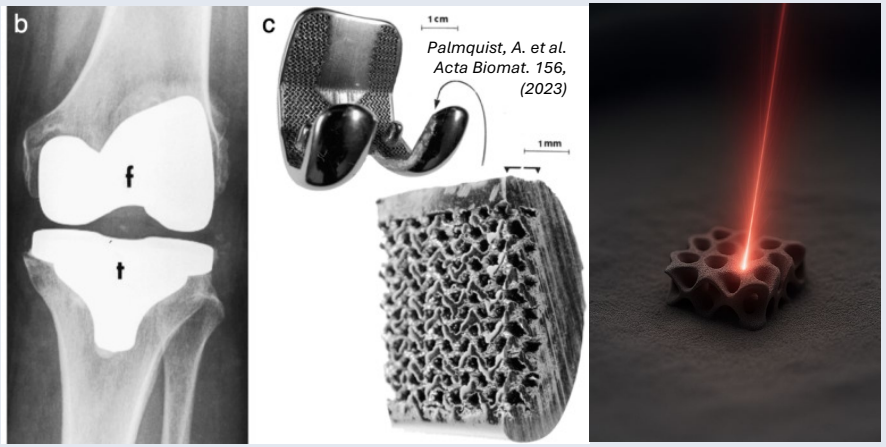
Ueda et al., *arXiv preprint,* 2024

Functionalization of Additively Manufactured Ti-alloy Scaffolds with Nanostructured ZIF-8 for Enhanced Anti-Microbial Protection

J. Huang, *Joining and Welding Research Institute, The University of Osaka*

The frontiers in titanium implant research have diverged

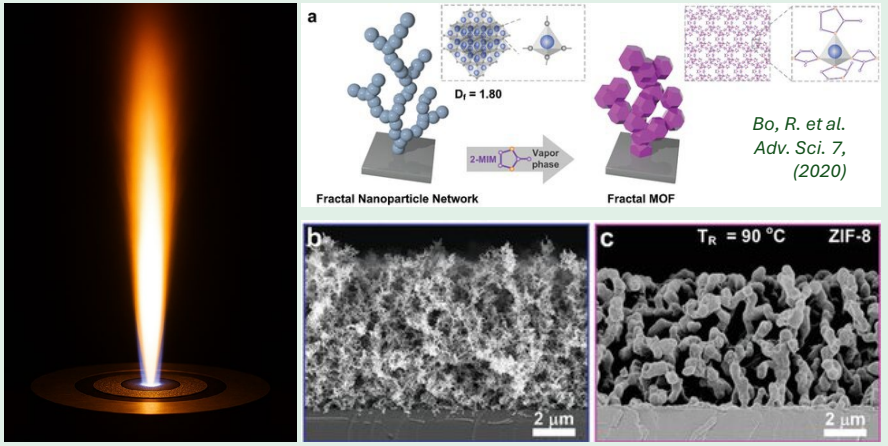
Structural Design



Bio-mimetic topology–property integration

Disciplinary Gap

Surface Technology



Bioactive nanostructured surface coatings

Geometrically Intricate

Limited to Flat Substrates

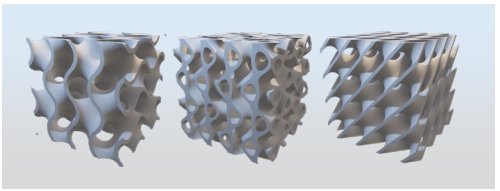
Joint translational research is necessary to combine the latest technologies

大阪大学 The University of Osaka
JWRI 大阪大学 接合科学研究所 Joining and Welding Research Institute The University of Osaka
NanoTech LABORATORY @ MACQUARIE University SYDNEY·AUSTRALIA
Australian National University

Functionalization of Additively Manufactured Ti-alloy Scaffolds with Nanostructured ZIF-8 for Enhanced Anti-Microbial Protection

Towards Scientific Integration of Scaffold Architecture and Surface Bio-functionalisation

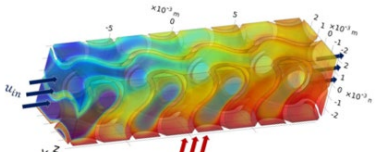
Scientific Gap



Nasiri, N. *et al. (Unpublished)*

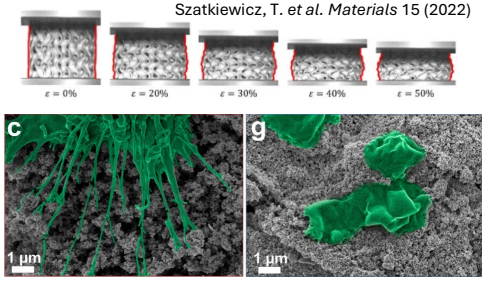
Lack of predictive framework for surface functionalisation on scaffolds.
Current techniques assume planar.

Project Contributions



Cheng, Z. *Et al. Int. J. Heat Mass Trans.* 170 (2021)

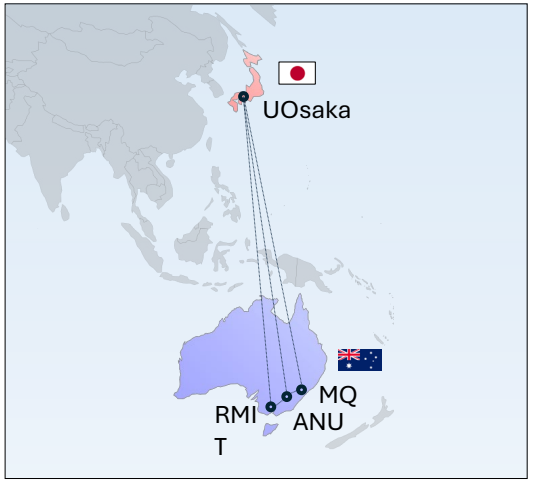
Szatkiewicz, T. *et al. Materials* 15 (2022)



Nasiri, N. *et al. Sci Rep* 6 (2016)

- Coating–structure interaction **insights**
- Robust **integration** on 3D lattices
- Potential **implementation** as bioactive implants

Academic Outcomes



Connect 4 Institutions (JP/AU)
Target 3 Papers, 2 Presentations
Position for long term grants and collab.

Connecting geometry, surface, and global research to advance implant science.

大阪大学 The University of Osaka
JWRI 大阪大学 接合科学研究所 Joining and Welding Research Institute The University of Osaka
NanoTech LABORATORY @ MACQUARIE University SYDNEY·AUSTRALIA
Australian National University

Research Topic: The Range of Republicanism in Mary Wollstonecraft

Mary Wollstonecraft (1759–1797)

Research Interests: the Enlightenment, Political Philosophy, Feminism

The “Pioneer” of Feminism in the Age of Enlightenment

Well known for: *A Vindication of the Rights of Woman* (1792)

Q1: Was Wollstonecraft a republican?

Q2: If so, what does “republicanism” refer to?

Q3: How can we adjust feminism and republicanism?

Host Researcher: Prof. Alan Coffee (King’s College London)

Masahiro Naito (Graduate School of Humanities)