FY 2025 Annual Report

Unit Name

Organic and Carbon Nanomaterials Unit
Associate Professor Akimitsu Narita

Research Personnel

Zakaria Ziadi, Staff Scientist

Md Imrul Khalid, Postdoctoral Scholar

Gao Zhiqiang, Postdoctoral Scholar (up to September, 2025)

Jingyun Tan, Postdoctoral Scholar

Hao Zhao, Postdoctoral Scholar (up to May, 2025)

Sobi Asako, Visiting Researcher

Marco Di Giovannantonio, Visiting Researcher

Hiroki Hanayama, Visiting Researcher

Xiushang Xu, Visiting Researcher

Goudappagouda, Visiting Researcher

José Ignacio Urgel, Visiting Researcher

Clément Delacou, Interdisciplinary Postdoctoral Fellow, Visiting Researcher, Narita Unit, OIST

Hui Zhang, Research Assistant

Takatsugu Onishi, PhD Student

Saurav Raj, PhD Student

Micaela Pozzati, Research Intern (January-June, 2025 and January-June, 2026)

Meissha Ayu Ardini, Research Intern (July, 2024-June, 2025)

Roger Simon De, Research Intern (November, 2024-April, 2025)

Syed Imtiaj Ahmed, Research Intern (March-June, 2026)

Soki Kawaguchi, Research Intern (March, 2026)

Ahmad El Hawli, Visiting Research Student (January-April 2025)

Scholarly Contributions and Creative Productions (by Faculty)

Journal Article

1. K. Sun, X. Xu, A. Ishikawa,* A. Narita,* S. Kawai,* On-surface synthesis of nonbenzenoid nanographenes through skeletal rearrangement reactions on Au(111). *Sci. Technol. Adv. Mater*. **2026**, *27*, 2619342.
2. T. Miyamoto,* H. Zhao, X. Zhu, M. Bonn, X. Liu, A. Narita, K. Numata,* Dual-function nanographene-peptide conjugates enable super-resolution mitochondria imaging and targeted DNA delivery in plants. *Carbon* **2026**, *247*, 120994.

3. R. Muñoz-Mármol,[#] S. Raj,[#] M. Russo,[#] G. Serra,[#] H. Zhao, G. Bassi, A. Lucotti, F. Scotognella, G. Cerullo, G. Lanzani, M. Tommasini,* M. Maiuri,* A. Narita,* G. M. Paternò,* Time-Domain Visualization of Electron-Phonon Coupling in Nanographenes. *Small Methods* **2026**, *10*, 2500419.
4. A. Kinikar,[#] X. Xu,[#] T. Onishi, A. Ortega-Guerrero, R. Widmer, N. Zema, C. Hogan, L. Camilli, L. Persichetti, C. A. Pignedoli, R. Fasel, A. Narita,* M. Di Giovannantonio,* On-surface synthesis of tailored organic platforms for single metal atoms. *Nat. Commun*. **2025**, *16*, 10597.
5. H. Wu, Z. Qiu,* G. Wen, A. Hinaut, K. Harano, R. Graf, D. Prezzi, L. Estaque, Y.-L. Tsai, D. Schollmeyer, G. Pieters, E. Molinari, R. Pawlak, E. Meyer, K. Kimoto, H. I. Wang, M. Bonn, K. Müllen,* A. Narita,* Laterally π-Extended Polyhelicenes. *J. Am. Chem. Soc*. **2025**, *147*, 43842–43849.
6. T. D. Bouloumis,* H. Zhao, N. Kokkinidis, Y. Hu, V. G. Truong, A. Narita, S. Nic Chormaic,* Disruptive Forces in Metamaterial Tweezers for Trapping Nanoparticles Containing Molecular Graphene Quantum Dots. *Adv. Opt. Mater*. **2025**, *13*, e01916.
7. D. Soler-Polo, O. Stetsovych, M. Kumar, B. Lowe, A. Barragán, Z. Gao, A. Pinar Solé, H. Zhao, E. Pérez-Elvira, Goudappagouda, D. Écija, A. Narita,* P. Jelínek,* J. I. Urgel,* Magnetic Ground State Discrimination of a Polyradical Nanographene Using Nickelocene-Functionalized Tips. *J. Am. Chem. Soc*. **2025**, *147*, 39072–39079.
8. M. I. Khalid,[#] N. M. Bojanowski,[#] R. S. De Febrer,[#] T. Onishi, X. Xu, Y. Okada, A. Narita,* Synthesis and Two-Dimensional Chiral Self-Assembly of Oxygen-Incorporated Dibenzo[*hi*,*st*]ovalene. *Org. Lett*. **2025**, *27*, 11837–11842.
9. A. Barragán, Goudappagouda, M. Kumar, D. Soler-Polo, E. Pérez-Elvira, A. Pinar Solé, A. García-Frutos, Z. Gao, K. Lauwaet, J. M. Gallego, R. Miranda, D. Écija,* P. Jelínek,* A. Narita,* J. I. Urgel,* Strong magnetic exchange coupling of a dibenzo-fused rhomboidal nanographene and its homocoupling with tunable periodicities on a metal surface. *Nanoscale* **2025**, *17*, 17769–17776.
10. S. Sun,[#] Q. Li,[#] T. Onishi, Goudappagouda, H. Zhou, L. Gao, Y. Okada, J. Lu,* A. Narita,* J. Cai,* On-Surface Synthesis of Nanographenes Through Domino Cyclization Reactions. *Angew. Chem. Int. Ed*. **2025**, *64*, e202425167.

*Equal author contributions are indicated by [#], corresponding authors are denoted by * (only when applicable to unit members), and unit members are underlined.*

Poster Presentation at Conference

1. A. Narita, “Molecular Engineering of Functional Nanocarbon Materials by Synthetic Chemistry,” Japan-Germany Frontiers of Engineering Program (JAGFOE) 2025, Tokyo, Japan, November 25–28, 2025.

Presentation at Conference

1. A. Narita, "ナノグラフェンの精密合成と分子構造に依存した特異な物性" The 105th CSJ Annual Meeting, Kansai University, Osaka, Japan, March 27, 2025.
2. A. Narita, "Development of Functional Nanographene-Based Materials", The 2nd OIST-OU Joint Symposium on Emergent Functional Materials and Reactions, Sigma Hall, The University of Osaka, Toyonaka Campus, May 8–9, 2025 (Keynote).
3. A. Narita, “Synthesis of Helical Nanographenes through Regioselective Cyclodehydrogenation,” B05 - Fullerenes - Endohedral Fullerenes and Molecular Carbon Nanocarbons, 247th ECS Meeting, Montréal, Canada, May 18-22, 2025.
4. A. Narita, “Functionalization of Dibenzo[*hi*,*st*]ovalene for On-Surface Synthesis of Open-Shell Nanographenes and Their Polymers,” B09 - On-Surface Synthesis of Carbon Nanomaterials, 247th ECS Meeting, Montréal, Canada, May 18-22, 2025.
5. A. Narita, “Synthesis of Molecular Nanographenes and Graphene Nanoribbons with Spins,” 1st International Conference on Molecular Spin Qubits Toward Quantum Computer and Sensors (ICMSQ2025), Sendai, Japan, June 9, 2025.

6. A. Narita, π 拡張型ラダーポリマーの合成と多彩な物性, 学術変革領域研究（B)ラダーポリマー科学〜二本の結合が紡ぐ革新〜キックオフシンポジウム, Nagoya University, Nagoya, Japan, July 2, 2025.
7. A. Narita, “Functionalization and π-Extension of Dibenzo[*hi*,*st*]ovalene Toward Molecular Nanographenes with Unusual Structures and Properties”, 10th Heron Island Conference on Reactive Intermediates and Unusual Molecules, Heron Island, Australia, July 6-12, 2025.
8. Z. Ziadi, “Nanomaterials and Nanofabrication for Sensing Applications” The 2nd SmoleQ Workshop, Hotel Concorde Hamamatsu, Shizuoka, Japan, July 25, 2025.
9. “A. Narita, Synthesis of Functionalized Nanographenes as Highly Stable Fluorophores for Super-Resolution Fluorescence Imaging,” The Second Asian Conference for “MONODUKURI” Strategy by Synthetic Organic Chemistry (ACMS 2025), Okinawa Convention Center, Okinawa, Japan, July 30–August 1, 2025.
10. Z. Ziadi, “Nanomaterials and Nanofabrication for Sensing Applications” The 13th International Conference on Nanomaterials and Advanced Energy Storage Systems (INESS-2025), Nazarbayev University, Astana, Kazakhstan, August 6-8, 2025.
11. A. Narita, “Molecular Nanographene Materials Based on Dibenzo[*hi*,*st*]ovalene: Emerging Properties and Potentials,” The 2nd International Symposium on Molecular Materials for Future (ISMMF-2), TOKYO ELECTRON House of Creativity, Katahira Campus, Tohoku University, Sendai, Japan, September 5, 2025.
12. A. Narita, “Synthesis and unique photophysical properties of functionalized nanographene molecules,” EU-Asia Workshop on Sustainable Technologies, VSB – Technical University of Ostrava, Faculty of Engineering and Computer Science, September 8–12, 2025.
13. A. Narita, “Synthesis and potential applications of molecular nanographene materials,” NPG Asia Materials Symposium, Okinawa Institute of Science and Technology Graduate University, Okinawa, Japan, November 13, 2025.
14. A. Narita, “Elongation of nanographenes toward laterally extended ladder polymers,” Symposium: Beyond Single-Bond Macromolecules: Advances In Ladder And Framework Polymers And Their Applications, The 2025 International Chemical Congress of Pacific Basin Societies (Pacifichem 2025), Honolulu, Hawaii, USA, December 15–20, 2025.
15. A. Narita, “Synthesis of functional nanographenes based on dibenzo[*hi*,*st*]ovalene,” Symposium: Chemistry Of Nanocarbons - Fullerenes, Carbon Nanotubes, Nanographenes And Beyond, The 2025 International Chemical Congress of Pacific Basin Societies (Pacifichem 2025), Honolulu, Hawaii, USA, December 15–20, 2025.
16. A. Narita, “Molecular Engineering of Nanographenes for Modulation of Their Spin Properties,” International Workshop on Spins and Molecules, NH Palermo, Sicily, Italy, January 11–14, 2026.
17. A. Narita, “超解像蛍光イメージングへの応用を志向した機能性ナノグラフェンの合成,” 学術変革領域研究（A）π 分子複雑性の追究が紡ぐ機能科学 第 4 回融合マッチングワークショップ, 国立研究開発法人物質・材料研究機構研究本館, Tsukuba, Japan, February 4, 2026.
18. A. Narita, “Synthesis and Functionalization of Molecular Nanographenes: Emerging Properties and Potentials,” Co-organized Symposium: π-Molecular Complexity: New Hierarchical Approach Bridging Structures, States, and Functions of π-Molecules, The 106th CSJ Annual Meeting, Nihon University, Chiba, Japan, March 17–20, 2026.

Scholarly Contributions (by Unit Members)

Name of Unit Member	Type	Title	Outlet	Publisher	Year Pub
Zakaria Ziadi	Journal Article	Study of the Cu(In,Ga)Se2 crystallization process through a combination of in-situ characterization techniques	Journal of Physics: Energy	IOP Publishing	2025
Jingyun Tan	Journal Article	Hexabenzoperylene-Cored Double Thiahelicenes with Strong Luminescence	Advanced Optical Materials	WILEY	2025

Name of Unit Member	Type	Title	Outlet	Publisher	Year Pub
Jingyun Tan	Journal Article	Controlled Helical Distortion of Double Thia[7]helicenes via Inner-Rim Alkyl Substitution	Organic Letters	ACS Publications	2026
Xiushang Xu	Journal Article	Synthesis of spiro borate-linked covalent organic frameworks (COFs) based on 1,3-diol borates	New Journal of Chemistry	The Royal Society of Chemistry	2026
Jingyun Tan	Journal Article	The helical elongation of π-extended diazahelicenes with amplified circularly polarized luminescence	Organic Letters	ACS Publications	2025
Md. Imrul Khalid	Journal Article	Electrochemical cascade access to hetero[8]circulenes as potent organophotocatalysts for diverse C–X bond formations	Nature Communications	Springer Nature	2025
Micaela Pozzati	Poster Presentation at Conference	Preparation of aqueous ink of bi-dimensional materials toward gas sensing	The 2nd OIST-OU Joint Symposium on Emergent Functional Materials and Reactions		
Jingyun TAN	Poster Presentation at Conference	Synthesis and Properties of a π-Extended Double [9]Helicene	The 13th International Symposium on Dynamic Exciton (ISDyEx)		
Hao Zhao	Poster Presentation at Conference	Photo-excited Nanographenes for Cancer Phototheranostics	The 13th International Symposium on Dynamic Exciton (ISDyEx)		
Saurav Raj	Poster Presentation at Conference	4,12-Difunctionalized Dibenzo[hi,st]ovalene: Synthesis and Photophysics	The 2nd OIST-OU Joint Symposium on Emergent Functional Materials and Reactions		
Clément Delacou	Poster Presentation at Conference	Gold-Free Perovskite Solar Cells using Graphene-Paper-Based Electrodes by Lamination	The 2nd OIST-OU Joint Symposium on Emergent Functional Materials and Reactions		
Zakaria Ziadi	Poster Presentation at Conference	Comparison of growth conditions on the semiconducting properties of CuO nanowires	Annual Meeting of the Japan Society of Vacuum and Surface Science 2025		
Saurav Raj	Presentation at Conference	Functionalization of Dibenzo[hi,st]ovalene at the "Apex" Positions	The 106th CSJ Annual Meeting		
Jingyun TAN	Presentation at Conference	Synthesis of a Curved Nanographene with Environment-responsive Behavior	The 106th CSJ Annual Meeting		
Fabian Steudel	Presentation at Conference	Towards Dibenzo[hi,st]ovalene-Embedded Nanohoops	RIKEN–OIST Joint Seminar on Emerging Nanocarbon Materials and Catalysis, RIKEN, Wako, Japan		
Fabian Steudel	Presentation at Conference	Supramolecular Fullerene–Nanohoop Architectures: Mechanically Interlocked [10]Cycloparaphenylene Shuttles and Nanographene-Embedded Hosts	The 106th CSJ Annual Meeting		

Name of Unit Member	Type	Title	Outlet	Publisher	Year Pub
Hao Zhao	Presentation at Conference	Self-Blinking Nanographene with Cationic Side Chains for Super-Resolution Bioimaging of Live-Cell Membrane	The 105th CSJ Annual Meeting		
Md. Imrul Khalid	Presentation at Conference	Synthesis and Optical Properties of Diazadibenzo[hi,st]ovalene Derivatives	The 105th CSJ Annual Meeting		
Md. Imrul Khalid	Presentation at Conference	Synthesis and Two-Dimensional Chiral Self-Assembly of Oxygen-Incorporated Dibenzo[hi,st]ovalene	The 106th CSJ Annual Meeting		
Saurav Raj	Presentation at Conference	Synthesis and optical properties of 4,12-dimethoxydibenzo[hi,st]ovalene and its conversion to bistriflate	The 105th CSJ Annual Meeting		
Zakaria Ziadi	Presentation at Conference	Nanomaterials and Nanofabrication for Sensing Applications	The 2nd SmoleQ Workshop		
Zakaria Ziadi	Presentation at Conference	Nanomaterials and Nanofabrication for Sensing Applications	13th International Conference on Nanomaterials and Advanced Energy Storage Systems (INESS-2025)		
Zhiqaing Gao	Presentation at Conference	Synthesis of Nanographenes with Ca2+ Triggered “Turn-On” Blinking Properties toward Super-Resolution Biosensing	The 105th CSJ Annual Meeting		
Jingyun TAN	Presentation at Conference	Synthesis of π-extended helicenes through cyclization of p-terphenyl-based precursors	The 105th CSJ Annual Meeting		
Zakaria Ziadi	Presentation at Conference	Nanomaterials and Nanofabrication for Sensing Applications	Annual Meeting of the Japan Society of Vacuum and Surface Science 2025		
Zakaria Ziadi	Presentation at Conference	Nanomaterials and Nanofabrication for Sensing Applications	MIRAI Workshop in Sustainable Materials: From Technologies to Policies		
Md. Imrul Khalid	Presentation at Conference	Synthesis of Polycyclic Heteroaromatic Molecules Based on Dibenzo[hi,st]ovalene	RIKEN–OIST Joint Seminar on Emerging Nanocarbon Materials and Catalysis, RIKEN, Wako, Japan		
Saurav Raj	Presentation at Conference	Substitution of Dibenzo[hi,st]ovalene at the "Apex“ Positions Towards Development of Functional Nanographenes	RIKEN–OIST Joint Seminar on Emerging Nanocarbon Materials and Catalysis, RIKEN, Wako, Japan		
Jingyun TAN	Presentation at Conference	Control of the Excited State Dynamics of Heptalene-based Nanographene	RIKEN–OIST Joint Seminar on Emerging Nanocarbon Materials and Catalysis, RIKEN, Wako, Japan		

Name of Unit Member	Type	Title	Outlet	Publisher	Year Pub
Cheng Yi Hou	Seminars	Pentagon-Heptagon Pair in the Sea of Hexagons: from Azulene to the Dislocation Defects in Graphene	OIST internal seminar		
Zakaria Ziadi	Seminars	Nanomaterials and Nanofabrication for Sensing Applications	SmoleQ Greeting Seminar (online)		
Zakaria Ziadi	Seminars	Nanomaterials and Nanofabrication for Sensing Applications	MIRAI Sweden-Japan Networking Workshop on Materials for Energy Conversion & Storage		

External Service

Term 1 2025 - Term 1 2025	Symposium organizer, The 2025 International Chemical Congress of Pacific Basin Societies (Pacifichem 2025), To organize the Symposium "Chemistry of Nanocarbons – Fullerenes, Carbon Nanotubes, Nanographenes and Beyond" [Fiscal Year: 2025-12-15]
Term 1 2025 - Term 1 2025	Co-chair, Japan-Germany Frontiers of Engineering Program (JAGFOE) 2025, Tokyo, Japan, organized by the Engineering Academy of Japan and the Alexander von Humboldt Foundation. [Fiscal Year: 2025-11-25]
Term 3 2025 - Term 3 2025	Organizer, The 2nd OIST-OU Joint Symposium on Emergent Functional Materials and Reactions, To organize the Symposium "The 2nd OIST-OU Joint Symposium on Emergent Functional Materials and Reactions" at The University of Osaka, Toyonaka Campus, Osaka, Japan [Fiscal Year: 2025-05-08]
Term 2 2025 - Term 3 2025	Co-Organizer for B05 symposium at the 247rd ECS Meeting, The Electrochemical Society, To organize the Symposium Topic "B05 - Fullerenes - Endohedral Fullerenes and Molecular Carbon" at the Meeting. [Fiscal Year: 2025]
Term 2 2023 - Ongoing	Associate Editor, Georg Thieme Verlag KG, "Organic Materials"
Term 2 2020 - Ongoing	A member of the Early Career Advisory Board (ECAB) of AsianJOC, The Asian Journal of Organic Chemistry (AsianJOC), Wiley-VCH

Other Institutional Service

Term 2 2026 - Term 2 2026	Lecture on Nanocarbon Molecular Science ("ナノカーボン分子科学"), (Narita - Organic and Carbon Nanomaterials Unit) [Fiscal Year: 2026-03-24]
Term 2 2026 - Term 2 2026	Faculty talk at OIST for the group of senior Japanese corporate leaders , (Narita - Organic and Carbon Nanomaterials Unit) [Fiscal Year: 2026-02-27]
Term 1 2025 - Term 1 2025	Faculty talk in the OIST Information Session at Imperial College London, UK, (Narita - Organic and Carbon Nanomaterials Unit) [Fiscal Year: 2025-10-17]
Term 3 2025 - Term 3 2025	Faculty talk at OIST for the students visiting from the University of Groningen, (Narita - Organic and Carbon Nanomaterials Unit) [Fiscal Year: 2025-08-14]
Term 2 2025 - Term 2 2025	Nanographenes prolong super-resolution microscopy from minutes to hours, (Narita - Organic and Carbon Nanomaterials Unit) [Fiscal Year: 2025-03-12]

Outreach Activities [For Unit Members Only]

Term 2 2026	Monte Jia Ying Tan, Gave presentation feedback to high school students in Kagoshima prefectural Gyokuryu High School, OIST [Fiscal Year: 2026-02-19]
Term 2 2026	Fabian Sterdel, Lab tour for the participants of the Science Challenge 2026 , OIST [Fiscal Year: 2026-03-09]

Term 2 2026	Monte Jia Ying Tan, Gave presentation feedback to high school students at INNOVATIVE FESTA - Multiple SSH Half Day SEED Program, OIST [Fiscal Year: 2026-01-27]
Term 2 2025	Clément Delacou, OIST Science Festival 2025, OIST [Fiscal Year: 2024]
Term 2 2025	Clément Delacou, Science Talk to Seibudai High School students, OIST [Fiscal Year: 2025]

Workshops and Seminars [Organized and Hosted by Faculty/Units]

Speaker Name(s)	Title	Location	Co-Organizers	Date
Symposium	RIKEN–OIST Joint Seminar on Emerging Nanocarbon Materials and Catalysis	RIKEN Center for Sustainable Resource Science (Wako, Saitama, Japan))	Dr. Laurean Ilies (RIKEN), Dr. Sobi Asako (RIKEN) and Prof. Akimitsu Narita (OIST)	2026-03-16
Yusuke Ishigaki (Hokkaido University)	[Seminar] TRA Lecture: "π-Molecular ComplexityEnabling Unusual Bond and Redox-Driven	L4E48, Lab 4, OIST		2026-03-02
Thomas A. Jung (Paul Scherrer Institut PSI, Switzerland)	TRA Lecture: "Molecular Lego for functional 2D Materials: Designing stable, free-standing and crystalline two-dimensional organic networks"	L4E48, Lab 4, OIST		2026-01-29
Keiji Numata (Kyoto University and RIKEN, Japan)	TRA Lecture: "Peptide-mediated gene delivery system for organellar modifications and biomanufacturing"	L4E48, Lab 4, OIST		2026-01-28
Marco Di Giovannantonio (CNR - Institute of Structure of Matter (CNR-ISM), Rome (Italy) ONSET Lab)	TRA Lecture: "On-Surface Synthesis of Atomically Precise Carbon-based Nanomaterials"	L4E01, Lab 4, OIST		2025-10-03
Marco Di Giovannantonio (CNR - Institute of Structure of Matter (CNR-ISM), Rome (Italy) ONSET Lab)	TRA Lecture: "On-Surface Synthesis of Atomically Precise Carbon-based Nanomaterials"	L4E48, Lab 4, OIST		2025-10-03
Takayuki Nakamuro (The University of Tokyo)	TRA Lecture: "Revealing the Invisible: Molecular Dynamics at the Atomic Scale"	L4E48, Lab 4, OIST		2025-09-24
C.-A. Palma (Chinese Academy of Sciences / Humboldt-Universität zu Berlin)	Low-temperature molecular physics at interfaces: From Heisenberg spin chains to topological phonon chains	L4F01, Lab 4, OIST		2025-08-26
Dr. Tomasz Marszalek (Max Planck Institute for Polymer Research)	Optimized Charge Transport in Molecular Semiconductors by Control of Fluid Dynamics and Crystallization in Meniscus-Guided Coating	L4F01, Lab 4, OIST		2025-07-23
Hideki Yorimitsu (Kyoto University)	Aromatic Metamorphosis: Skeletal Editing of Aromatic Rings	L4F01, Lab 4, OIST		2025-06-24
Mathias Kläui (Institute of Physics, Johannes Gutenberg-University)	2D Materials and thin film heterostructures for GreenIT: from chirality effects to novel materials systems for AI	L5D23, Lab 5, OIST		2025-04-24

Speaker Name(s)	Title	Location	Co-Organizers	Date
Teresa Gatti (Politecnico di Torino, Italy & JustusLiebig University Giessen, Germany)	Exploring the flatland of bi-dimensional materials for energy and(opto)electronics	L4E48, OIST		2025-04-10