

## **Koji HARANO (原野幸治) , Dr.**

Principal Researcher

Electron Microscopy Group

Center for Basic Research on Materials (CBRM)

National Institute for Materials Science (NIMS)



Professor (NIMS Joint Graduate School)

Department of Applied Chemistry

Graduate School of Engineering

Kyushu University

Visiting Professor

Research Center for Autonomous Systems Materialogy (ASMat)

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**Birth:** March 21, 1980, Ube (Yamaguchi Prefecture), Japan

**Nationality:** Japan

**Language:** Japanese and English

### **Research Interest:**

Molecular Science and Nanoscience Explored by Electron Microscopy

Single-Molecule Atomic-Resolution Real-Time Electron Microscopy (SMART-EM)

### **Education:**

2002 B.S. (Chemistry)

Department of Chemistry, The University of Tokyo (Prof. Mitsuhiro Shionoya)

2007 Ph.D. (Chemistry)

Department of Chemistry, The University of Tokyo (Prof. Mitsuhiro Shionoya)

### **Research and Professional Experience:**

2004 Apr.-2007 Mar. Young Research Fellow of Japan Society for the Promotion of Science (JSPS, DC1)

|                     |                                                                                                                                                                |
|---------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 2007 Apr.-Jun.      | Postdoctoral Researcher, Department of Chemistry, Tohoku University<br>(Prof. Masahiro Yamashita's group)                                                      |
| 2007 Jul.-2015 Mar. | Assistant Professor, Department of Chemistry, The University of Tokyo<br>(Prof. Eiichi Nakamura's group)                                                       |
| 2015 Apr.-2022 Jan. | Project Associate Professor, Organization for Interdisciplinary Research<br>Projects, The University of Tokyo                                                  |
| 2022 Feb.-2023 Mar. | Principal Researcher, Electron Microscopy Group, Research Center for<br>Advanced Measurement and Characterization, National Institute for<br>Materials Science |
| 2023 Apr.-present   | Principal Researcher, Electron Microscopy Group, Center for Basic<br>Research on Materials, National Institute for Materials Science                           |

#### **Academic Experience:**

|                    |                                                                                                                                                             |
|--------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 2016               | Outside Lecturer, Rikkyo University                                                                                                                         |
| 2018               | Outside Lecturer, Tokyo University of Science                                                                                                               |
| 2019               | Outside Lecturer, Ibaraki University                                                                                                                        |
| 2021               | Outside Lecturer, Ochanomizu University                                                                                                                     |
| 2021               | Outside Lecturer, Saitama University                                                                                                                        |
| 2023 Apr.          | Collaborator, Living Systems Materialogy (LiSM) Research Group<br>International Research Frontiers Initiative (IRFI)<br>Tokyo Institute of Technology       |
| 2023 May–2024 Mar. | Visiting Professor, Living Systems Materialogy (LiSM) Research Group<br>International Research Frontiers Initiative (IRFI)<br>Tokyo Institute of Technology |
| 2024 Apr.–present  | Visiting Professor, Institute of Innovative Research (IIR), Research Center<br>for Autonomous Systems Materialogy (ASMat)<br>Institute of Science Tokyo     |
| 2024               | Outside Lecturer, Tohoku University                                                                                                                         |

#### **Membership:**

The Chemical Society of Japan  
 Division of the Organic Crystals, The Chemical Society of Japan  
 The Japanese Society of Microscopy  
 The Society of Physical Organic Chemistry, Japan  
 Fullerenes, Nanotubes and Graphene Research Society, Japan  
 The Society of Polymer Science, Japan  
 The Society of Synthetic Organic Chemistry, Japan  
 Japan Society of Coordination Chemistry

**Professional Functions:**

- 2016- Publicity Committee, Division of the Organic Crystals, The Chemical Society of Japan  
2017- Representative member, The Chemical Society of Japan  
2016-2018 Collaborator, “Dynamical Ordering of Biomolecular Systems for Creation of Integrated Functions”, Grant-in-Aid for Scientific Research on Innovative Areas, MEXT, Japan

**Awards:**

- 2004 Poster Award, The 54th Symposium on Coordination Chemistry of Japan  
2005 Student Presentation Award, The 87th Annual Meeting of the Chemical Society of Japan  
2005 Poster Award, Tokyo Summer School on Frontier Chemistry 2005  
2009 25th Inoue Research Award for Young Scientists  
2012 Global COE Lectureship Award  
2014 Presentation Award, The 94th Annual Meeting of the Chemical Society of Japan  
2015 Rising Star Prize, CREST Molecular Technology, Japan Science and Technology Agency  
2016 The 65th Chemical Society of Japan Award for Young Chemists  
2016 The 9th Kazato Research Encouragement Prize  
2018 Chemist Award BCA, MSD Life Science Foundation  
2019 Thieme Chemistry Journals Award  
2019 The Young Scientists' Prize, The Commendation for Science and Technology by the Minister of Education, Culture, Sports, Science and Technology  
2019 Encouragement Award, The Japan Society of Microscopy  
2020 BCSJ Award (June Issue), Chemical Society of Japan  
2020 Nozoe Memorial Award for Young Organic Chemists, The Society of Physical Organic Chemistry, Japan  
2020 BCSJ Award (September Issue), Chemical Society of Japan  
2021 BCSJ Award (February Issue), Chemical Society of Japan  
2022 The 63rd Science and Technology Film/Video Festival, R&D Section Award, Japan Science Foundation  
2023 Chemical Communication Award 2022 (Special Jury Prize), Japan Union of Chemical Science and Technology

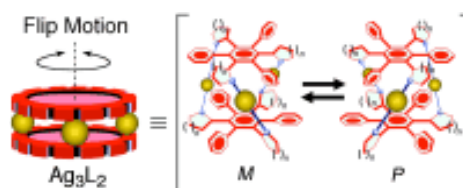
**Grants:**

- 2004-2007 Grant-in-Aid for JSPS Fellows, MEXT, Japan  
2007-2008 Global COE Grants to Young Researchers, MEXT, Japan

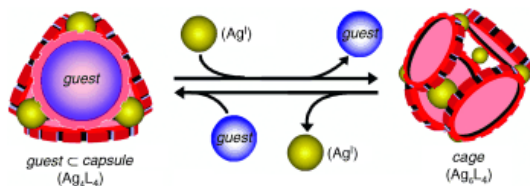
|           |                                                                                                       |
|-----------|-------------------------------------------------------------------------------------------------------|
| 2009-2011 | Grant-in-Aid for Young Scientists (B), MEXT, Japan                                                    |
| 2010-2011 | Global COE Grants to Young Researchers, MEXT, Japan                                                   |
| 2011-2012 | Challenging Exploratory Research, MEXT, Japan                                                         |
| 2012-2014 | Grant-in-Aid for Scientific Research on Innovative Areas, MEXT, Japan                                 |
| 2013-2015 | Challenging Exploratory Research, MEXT, Japan                                                         |
| 2014-2017 | Grant-in-Aid for Young Scientists (A), MEXT, Japan                                                    |
| 2015-2019 | Grant-in-Aid for Scientific Research (S), MEXT, Japan (Co-investigator)                               |
| 2016-2018 | Kazato Research Foundation, Japan                                                                     |
| 2016-2018 | Challenging Exploratory Research, MEXT, Japan                                                         |
| 2016-2020 | Team Reader, Development of Systems and Technology for Advanced Measurement and Analysis, JST, Japan  |
| 2017-2020 | Grant-in-Aid for Scientific Research (B), MEXT, Japan                                                 |
| 2017-2019 | Grant-in-Aid for Scientific Research on Innovative Areas, MEXT, Japan                                 |
| 2019-2021 | Grant-in-Aid for Scientific Research on Innovative Areas, MEXT, Japan                                 |
| 2019-2024 | Grand-in-Aid for Specially Promoted Research, MEXT, Japan (Co-Investigator)                           |
| 2019-2020 | Research Grant, Kondo Zaidan, Japan                                                                   |
| 2020-2022 | Grant-in-Aid for Scientific Research on Innovative Areas, MEXT, Japan                                 |
| 2020-2026 | CREST, JST, Japan (Co-Investigator)                                                                   |
| 2021-2024 | Grant-in-Aid for Scientific Research (B), MEXT, Japan                                                 |
| 2022-2023 | Grant-in-Aid for Scientific Research on Innovative Areas, MEXT, Japan                                 |
| 2023-2028 | Grant-in-Aid for Transformative Research Areas (A) “Materials Science of Meso-Hierarchy”, MEXT, Japan |
| 2023-2025 | Advanced Research Program for Energy and Environmental Technologies, NEDO, Japan (Co-Investigator)    |
| 2024-2027 | Grant-in-Aid for Scientific Research (B), MEXT, Japan                                                 |

## Publications List:

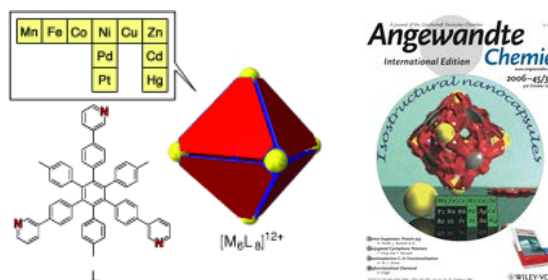
- Quantitative Formation of Sandwich-Shaped Trinuclear Silver(I) Complexes and Dynamic Feature of Their  $P \leftrightarrow M$  Flip Motion in Solution, S. Hiraoka, K. Harano, T. Tanaka, M. Shiro, M. Shionoya,\* *Angew. Chem. Int. Ed.* **42**, 5182–5185 (2003).



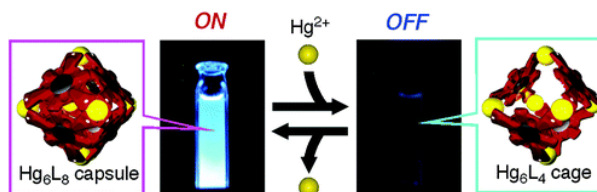
2. Quantitative Dynamic Interconversion between Ag(I)-Mediated Capsule and Cage Complexes Accompanying Guest Encapsulation/Release, S. Hiraoka, K. Harano, M. Shiro, M. Shionoya,\* *Angew. Chem. Int. Ed.* **44**, 2727–2731 (2005).



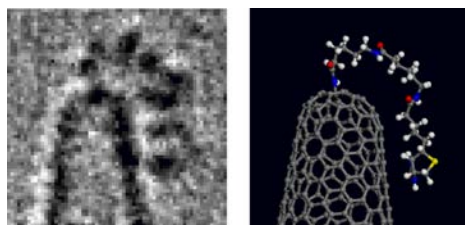
3. Isostructural Coordination Capsules for a Series of Ten Different  $d^5$ – $d^{10}$  Transition-Metal Ions S. Hiraoka, K. Harano, M. Shiro, Y. Ozawa, N. Yasuda, K. Toriumi, M. Shionoya,\* *Angew. Chem. Int. Ed.* **45**, 6488–6491 (2006). (selected as Very Important Paper & Cover Picture)



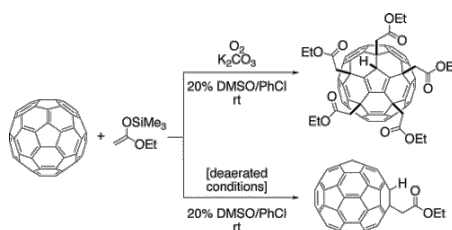
4. 3 nm-Scale Molecular Switching between Fluorescent Coordination Capsule and Nonfluorescent Cage, K. Harano, S. Hiraoka, M. Shionoya,\* *J. Am. Chem. Soc.* **129**, 5300–5301 (2007).



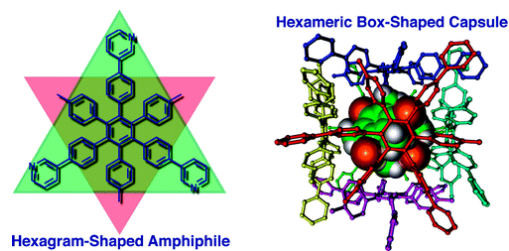
5. Imaging of Conformational Changes of Biotinylated Triamide Molecules Covalently Bonded to a Carbon Nanotube Surface, E. Nakamura,\* M. Koshino, T. Tanaka, Y. Niimi, Y. Nakamura, K. Harano, H. Isobe, *J. Am. Chem. Soc.* **130**, 7808–7809 (2008). (Highlighted in *Chem. & Eng. News* **86**, 33–34 (2008); *JACS* Image Challenge #27)



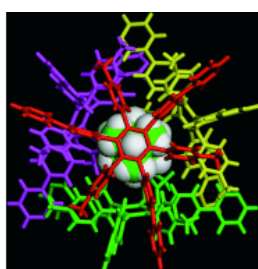
6. Mono- and Penta-Addition of Enol Silyl Ethers to [60]Fullerene, E. Nakamura,\* S. Mouri, Y. Nakamura, K. Harano, H. Isobe,\* *Org. Lett.* **10**, 4923–4926 (2008).



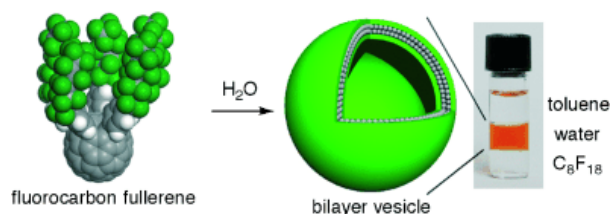
7. A Self-Assembled Organic Capsule Formed from the Union of Six Hexagram-Shaped Amphiphile Molecules, S. Hiraoka,\* K. Harano, M. Shiro, M. Shionoya,\* *J. Am. Chem. Soc.* **130**, 14368–14369 (2008).



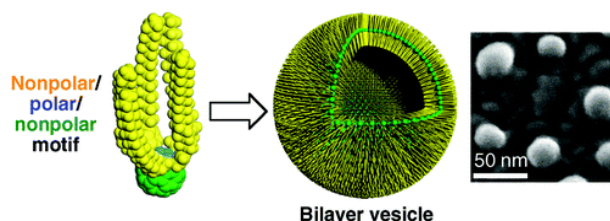
8. Induced-Fit Formation of a Tetrameric Organic Capsule Consisting of Hexagram-Shaped Amphiphile Molecules, S. Hiraoka,\* K. Harano, T. Nakamura, M. Shiro, M. Shionoya,\* *Angew. Chem. Int. Ed.* **48**, 7006–7009 (2009).



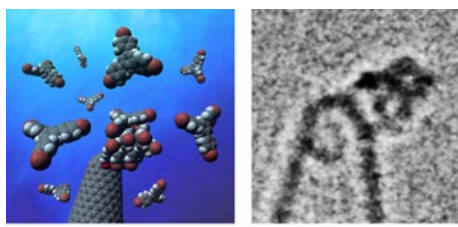
9. Nanometer-Sized Fluorous Fullerene Vesicles in Water and on Solid Surfaces, T. Homma, K. Harano, H. Isobe, E. Nakamura,\* *Angew. Chem. Int. Ed.* **49**, 1665–1668 (2010).



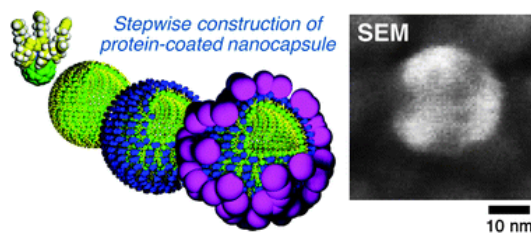
10. Preparation and Properties of Vesicles Made of Nonpolar/Polar/Nonpolar Fullerene Amphiphiles, T. Homma, K. Harano, H. Isobe, E. Nakamura,\* *J. Am. Chem. Soc.* **133**, 6364–6370 (2011).



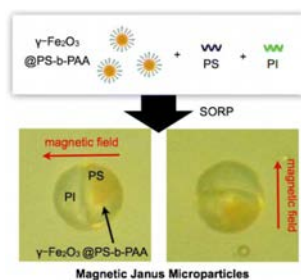
11. Heterogeneous Nucleation of Organic Crystals Mediated by Single-Molecule Templates, K. Harano, T. Homma, Y. Niimi, M. Koshino, K. Suenaga, L. Leibler, E. Nakamura,\* *Nat. Mater.* **11**, 877–881 (2012). (Highlighted in News and Views; P. Vekilov, *Nat. Mater.* **11**, 838–840 (2012).)



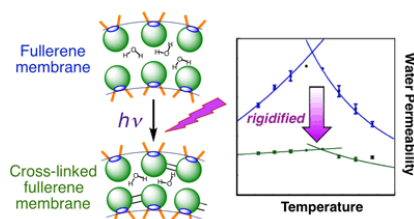
12. Protein-coated Nanocapsules via Multilevel Surface Modification. Controlled Preparation and Microscopic Analysis at Nanometer Resolution, K. Harano, K. Minami, E. Noiri, K. Okamoto, E. Nakamura,\* *Chem. Commun.* **49**, 3525–3527 (2013).



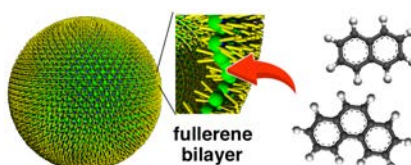
13. Polymer Janus Particles Containing Block-Copolymer Stabilized Magnetic Nanoparticles, H. Yabu,\* M. Kanahara, M. Shimomura, T. Arita, K. Harano, E. Nakamura, T. Higuchi, H. Jinnai, *ACS Appl. Mater. Interfaces*, **5**, 3262-3266 (2013).



14. Photocrosslinking of Fullerene Vesicles that Prevents Phase Transition and Decreases Water Permeation, K. Harano, A. Narita, E. Nakamura,\* *Chem. Lett.*, **42**, 1176-1178 (2013). (Selected as Editor's Choice)

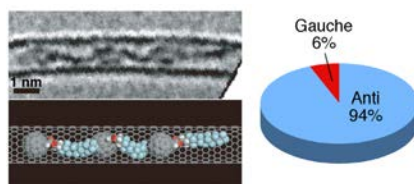


15. Binding of Aromatic Molecules in the Fullerene-Rich Interior of a Fullerene Bilayer Vesicle in Water, K. Harano, R. M. Gorgoll, E. Nakamura,\* *Chem. Commun.*, **49**, 7629-7631 (2013).

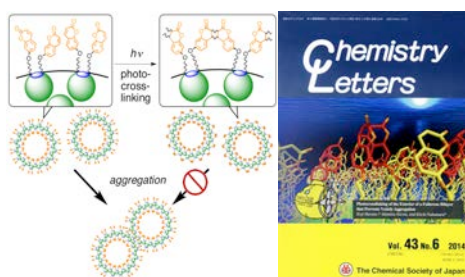




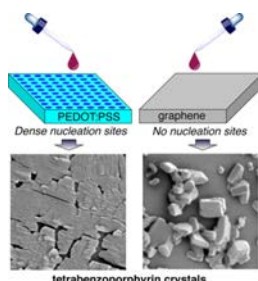
16. Conformational Analysis of Single Perfluoroalkyl Chains by Single-Molecule Real-Time Transmission Electron Microscopic Imaging, K. Harano,\* S. Takenaga, S. Okada, Y. Niimi, N. Yoshikai, H. Isobe, K. Suenaga, H. Kataura, M. Koshino,\* E. Nakamura,\* *J. Am. Chem. Soc.*, **136**, 466-473 (2014).



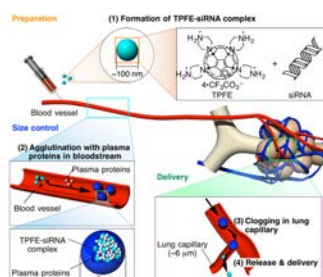
17. Photocrosslinking of the Exterior of a Fullerene Bilayer that Prevents Vesicle Aggregation, K. Harano,\* A. Narita, E. Nakamura,\* *Chem. Lett.*, **43**, 877-879 (2014). (Selected as Editor's Choice and Cover picture)



18. Formation of a Polycrystalline Film of Donor Material on PEDOT:PSS Buffer Induced by Crystal Nucleation, K. Harano,\* S. Okada, S. Furukawa, H. Tanaka, E. Nakamura,\* *J. Polym. Sci. Pol. Phys.* **52**, 833-841 (2014).

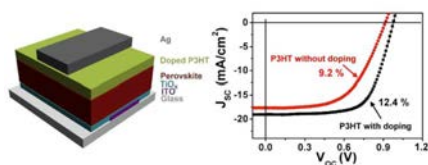


19. siRNA Delivery Targeting to the Lung via Agglutination-Induced Accumulation and Clearance of Cationic Tetraamino Fullerene, K. Minami, K. Okamoto, K. Doi, K. Harano, E. Noiri,\* E. Nakamura,\* *Sci. Rep.* **4**, 4916 (2014).

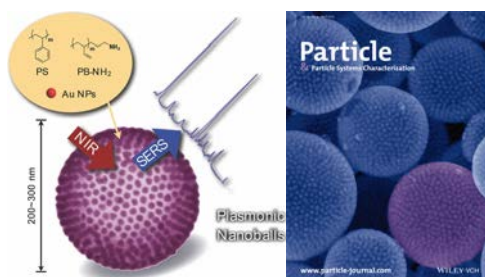




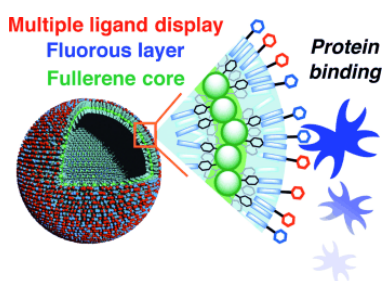
20. Enhancement in the Efficiency of an Organic–Inorganic Hybrid Solar Cell with a Doped P3HT Hole-Transporting Layer on a Void-Free Perovskite Active Layer, Y. Guo, C. Liu, K. Inoue, K. Harano, H. Tanaka,\* E. Nakamura,\* *J. Mater. Chem. A* **2**, 13827–13830 (2014).



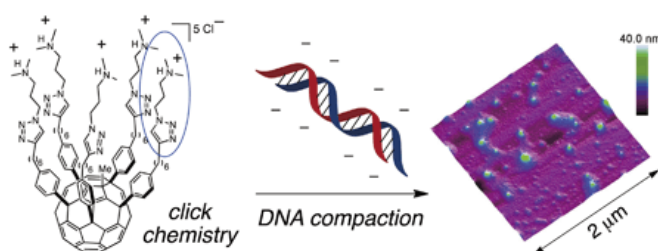
21. Fabrication of NIR-Excitable SERS-Active Composite Particles Comprised of Densely-Packed Au Nanoparticles on Polymer Microparticles, M. Kanahara, H. Satoh, T. Higuchi, A. Takahara, H. Jinnai, K. Harano, S. Okada, E. Nakamura, Y. Matsuo, H. Yabu,\* *Part. Part. Syst. Charact.* **32**, 441–447 (2015). (Selected as Cover picture)



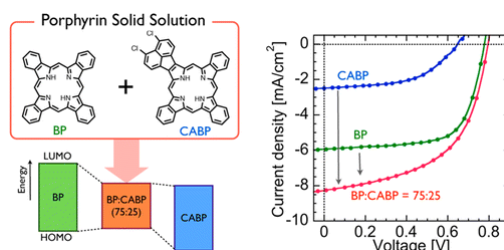
22. High-Density Display of Protein Ligands on Self-Assembled Capsules via Noncovalent Fluorous Interactions, K. Harano,\* J. Yamada, S. Mizuno, E. Nakamura,\* *Chem. Asian J.* **10**, 172–176 (2015).



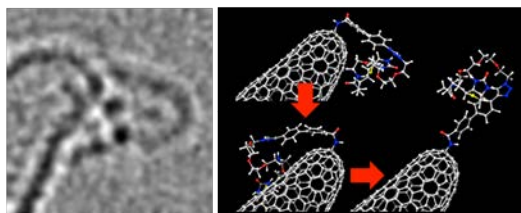
23. DNA Binding of Pentaamino[60]fullerene Synthesized using Click Chemistry, H. Nitta, K. Minami, K. Harano,\* E. Nakamura,\* *Chem. Lett.*, **44**, 378–380 (2015). (Selected as Editor's Choice)



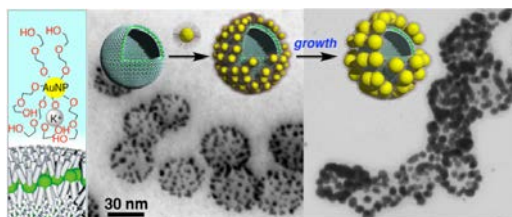
24. Organic Solid Solution Composed of Two Structurally Similar Porphyrins for Organic Solar Cells, Y. Zhen, H. Tanaka, K. Harano, S. Okada, Y. Matsuo,\* E. Nakamura,\* *J. Am. Chem. Soc.*, **137**, 2247–2252 (2015).



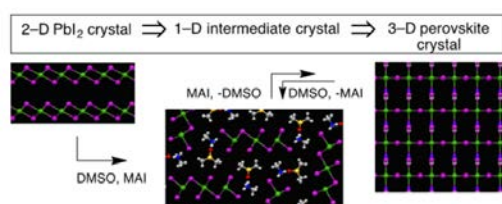
25. Electron Microscopic Observation of Selective Excitation of Conformational Change of a Single Organic Molecule, R. M. Gorgoll, E. Yücelen, A. Kumamoto, N. Shibata, K. Harano,\* E. Nakamura,\* *J. Am. Chem. Soc.*, **137**, 3474–3477 (2015).



26. Cooperative Self-Assembly of Gold Nanoparticles on the Hydrophobic Surface of Vesicles in Water, R. M. Gorgoll, T. Tsubota, K. Harano,\* E. Nakamura,\* *J. Am. Chem. Soc.*, **137**, 7568–7571 (2015).



27. Chemical Pathways Connecting Lead(II) Iodide and Perovskite via Polymeric Plumbate(II) Fiber, Y. Guo, K. Shoyama, W. Sato, Y. Matsuo, K. Inoue, K. Harano, C. Liu, H. Tanaka, E. Nakamura,\* *J. Am. Chem. Soc.*, **137**, 15907–15914 (2015).



28. Nanoscale Control of Polymer Assembly on a Synthetic Catalyst-Bilayer System, R. M. Gorgoll, K. Harano,\* E. Nakamura,\* *J. Am. Chem. Soc.*, **138**, 9675–9681 (2016).



29. Supramolecular Differentiation for Constructing Anisotropic Fullerene Nanostructures by Time-Programmed Control of Interfacial Growth, P. Bairi, K. Minami,\* J. P. Hill, W.

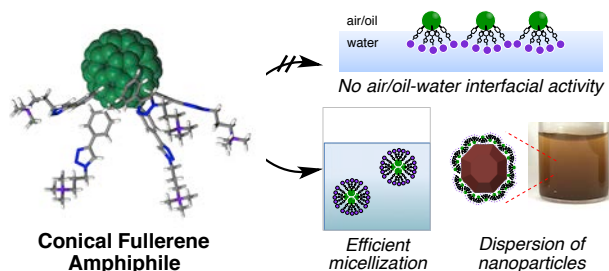
Nakanishi, L. K. Shrestha, C. Liu, K. Harano, E. Nakamura, K. Ariga,\* *ACS Nano*, **10**, 8796–8802 (2016).



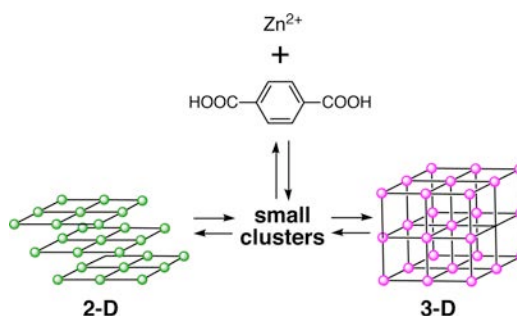
30. Heterogeneous Catalase-like Activity of Gold(I)-Cobalt(III) Metallosupramolecular Ionic Crystals, M. Yamada, N. Yoshinari, N. Kuwamura, T. Saito, S. Okada, S. P. Maddala, K. Harano, E. Nakamura, K. Yamagami, K. Yamanaka, A. Sekiyama, T. Suenobu, Y. Yamada, T. Konno,\* *Chem. Sci.*, **8**, 2671–2676 (2017).



31. Conical Ionic Amphiphiles Endowed with Micellization Ability but Lacking Air– and Oil–Water Interfacial Activity, H. Nitta, K. Harano,\* M. Isomura, E. H. G. Backus, M. Bonn, E. Nakamura,\* *J. Am. Chem. Soc.*, **139**, 7677–7680 (2017).

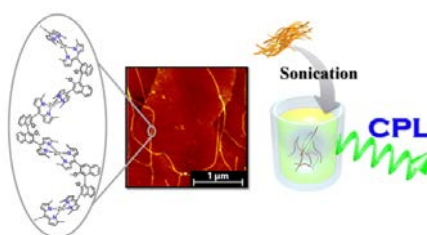


32. Experimental Study on Interconversion between Cubic MOF-5 and Square MOF-2 Arrays, L. Schweighauser, K. Harano,\* E. Nakamura,\* *Inorg. Chem. Commun.*, **84**, 1–4 (2017).

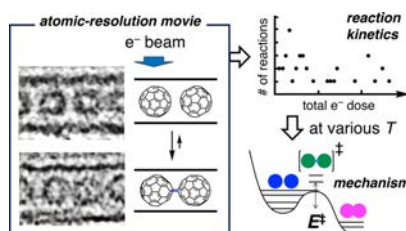


33. Bis(dipyrinato)zinc(II) Complex Chiroptical Wires: Exfoliation into Single Strands and Intensification of Circularly Polarized Luminescence, R. Aoki, R. Toyoda, J. F. Kögel, R.

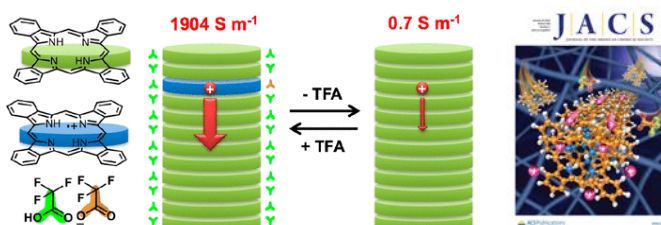
Sakamoto,\* J. Kumar, Y. Kitagawa, K. Harano, T. Kawai, H. Nishihara,\* *J. Am. Chem. Soc.*, **139**, 16024–16027 (2017).



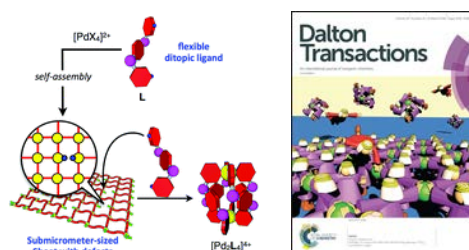
34. Direct Microscopic Analysis of Individual C<sub>60</sub> Dimerization Events: Kinetics and Mechanisms, S. Okada, S. Kowashi, L. Schweighauser, K. Yamanouchi, K. Harano,\* E. Nakamura,\* *J. Am. Chem. Soc.*, **139**, 18281–18287 (2017). (Highlighted in Kagaku Kogyo Nippo, Kagaku Shinbun, Gendai Kagaku, Kagaku, Chem-Station, and JEOL website)



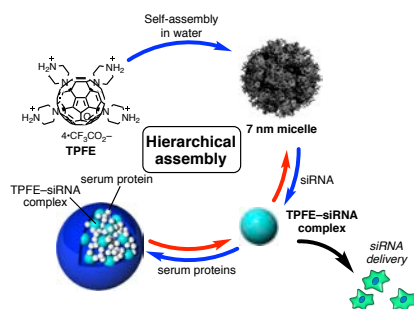
35. Acid-Responsive Conductive Nanofiber of Tetrabenzoporphyrin Made by Solution Processing, Y. Zhen,\* K. Inoue, Z. Wang, T. Kusamoto, K. Nakabayashi, S. Ohkoshi, W. Hu, Y. Guo,\* K. Harano,\* E. Nakamura,\* *J. Am. Chem. Soc.*, **140**, 62–65 (2018). (Selected as Cover picture)



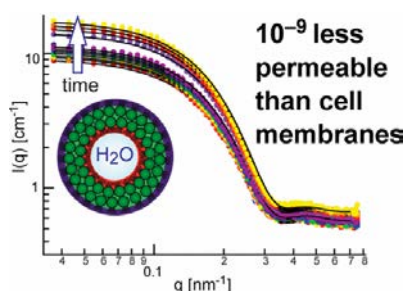
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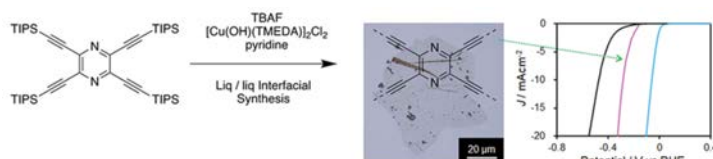
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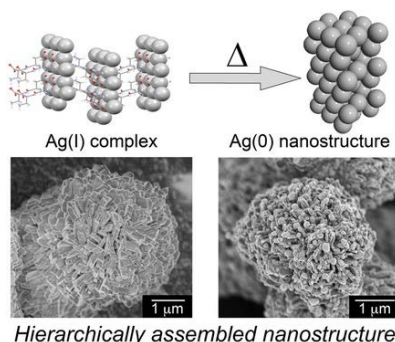
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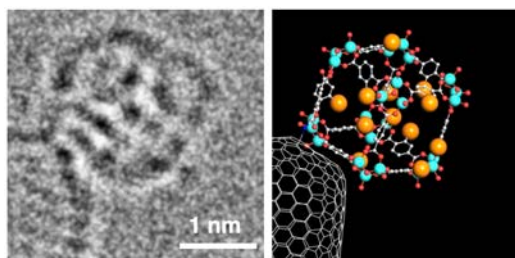
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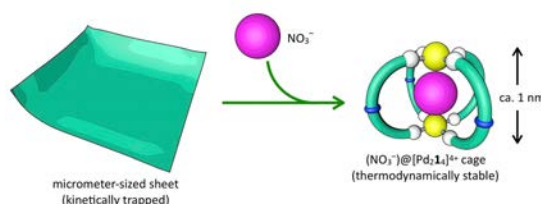
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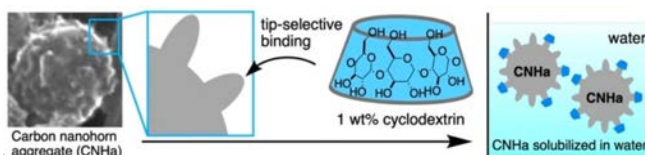
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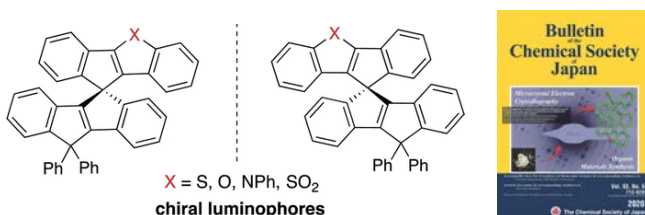
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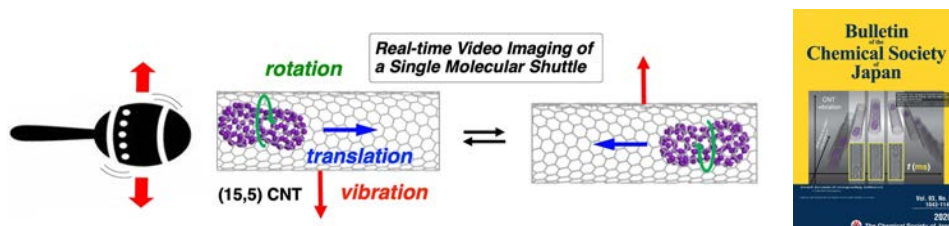
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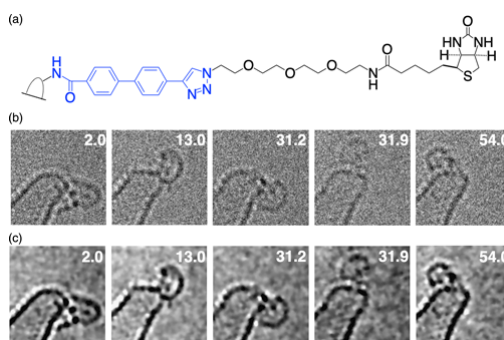
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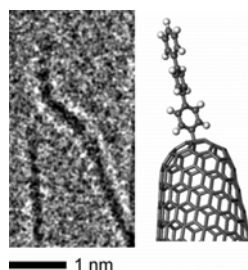
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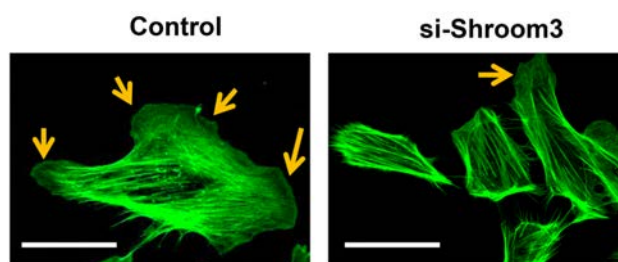


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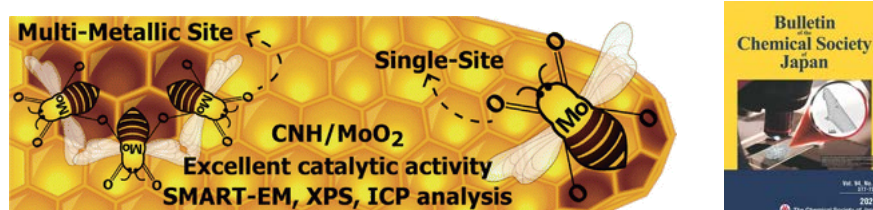


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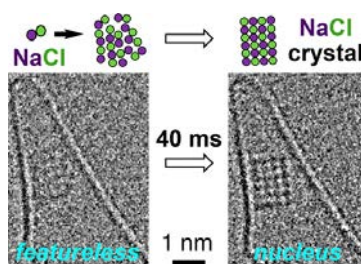




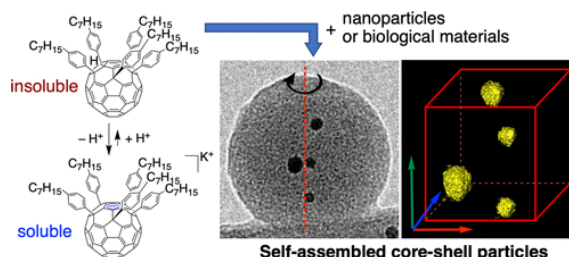
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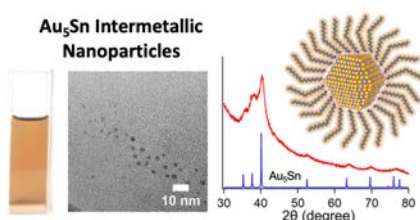
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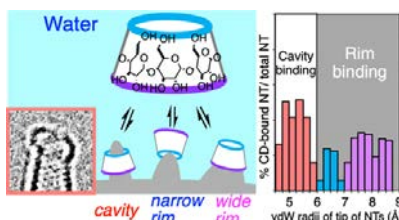
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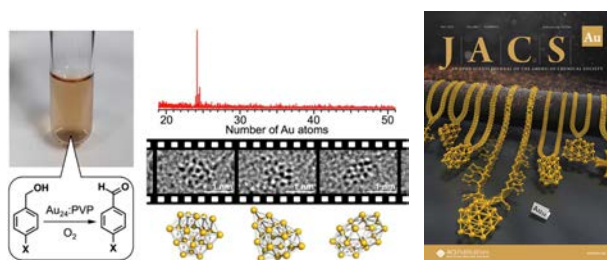
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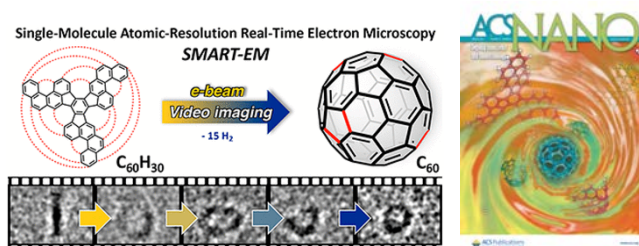
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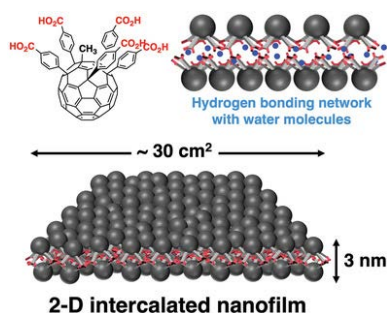
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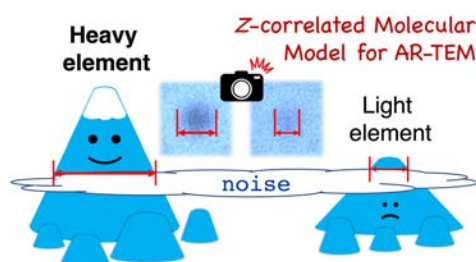
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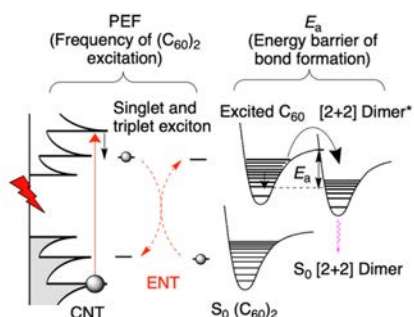
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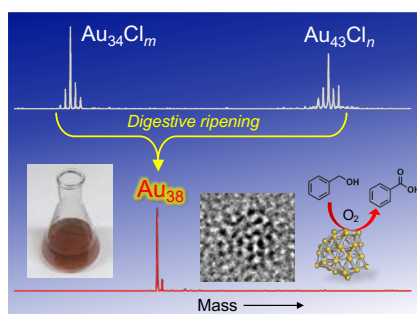
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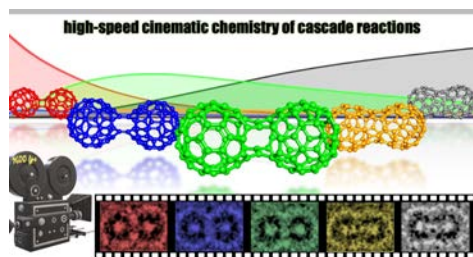
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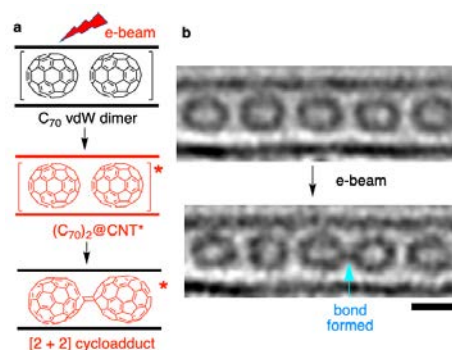
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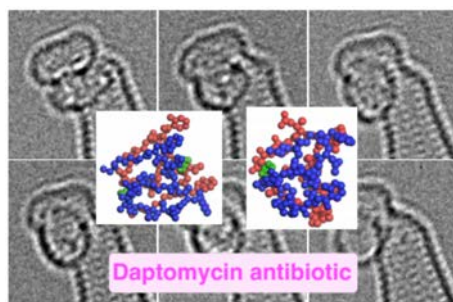
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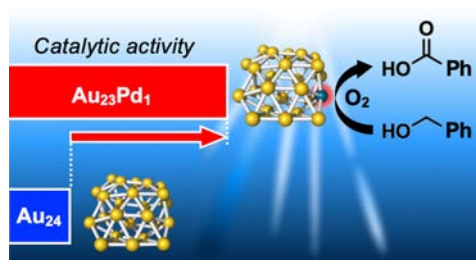
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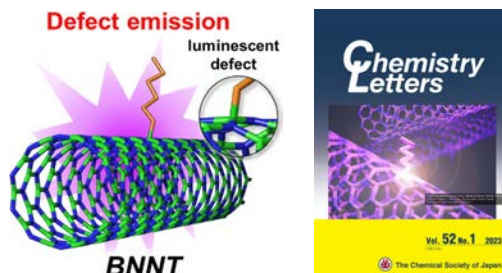


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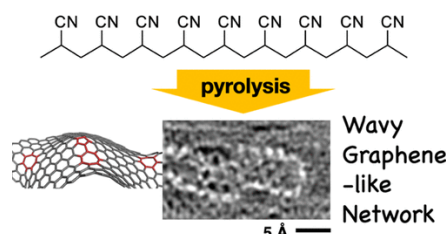




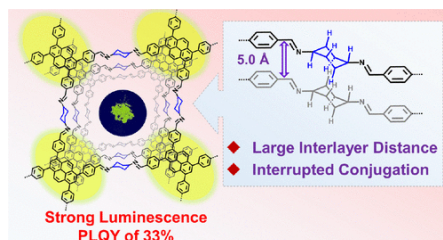
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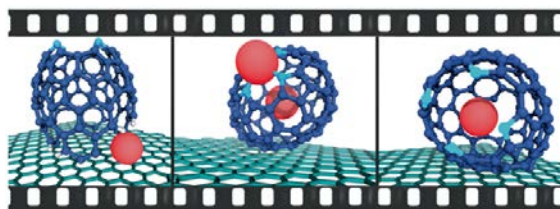
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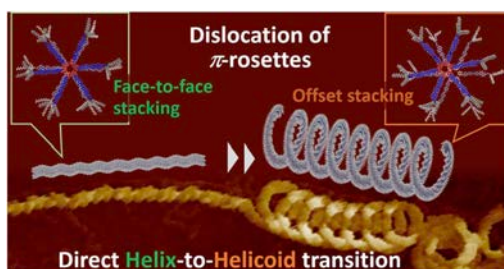
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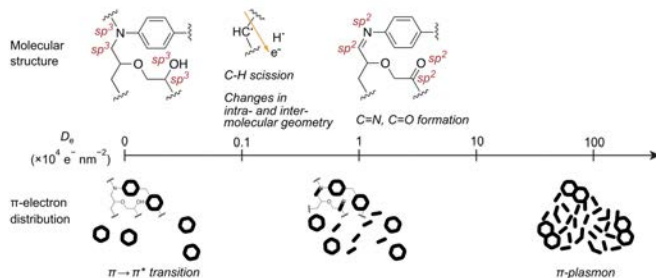
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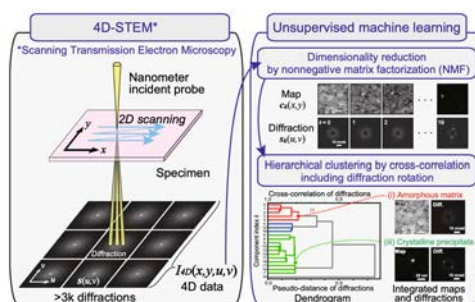
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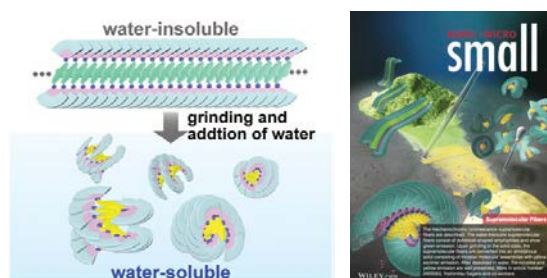


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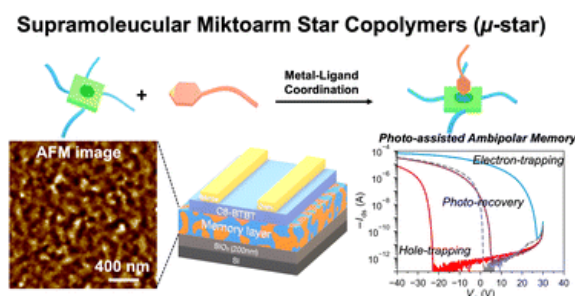




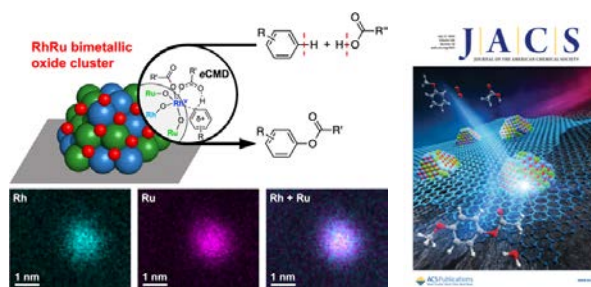
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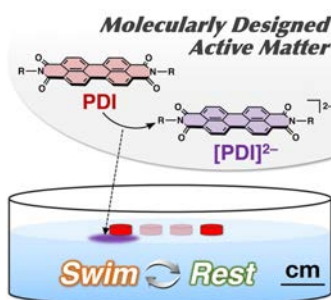
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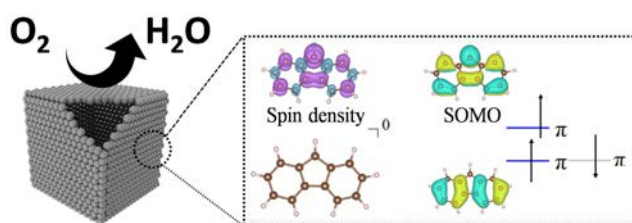
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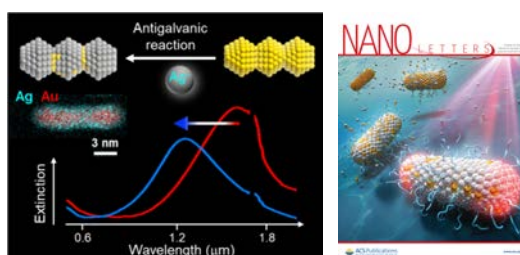
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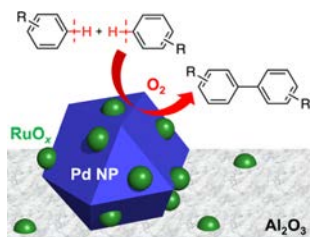
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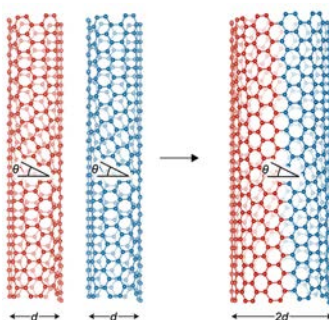
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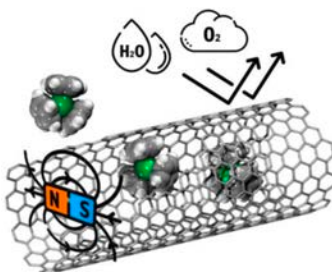
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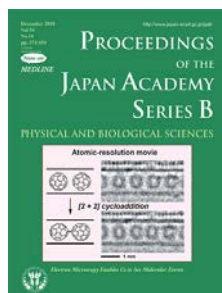
1. Submillisecond Electron Microscopic Video Imaging for Cinematic Molecular Science, K. Harano,\* *Microsc. Microanal.* **28**, 1924–1925 (2022).

## Accounts/Reviews:

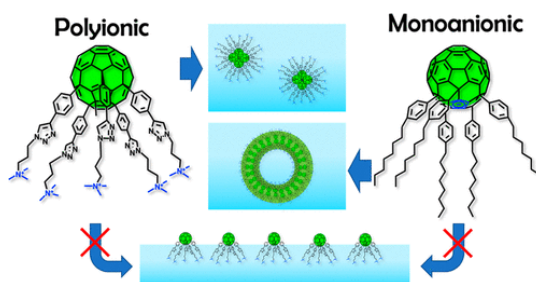
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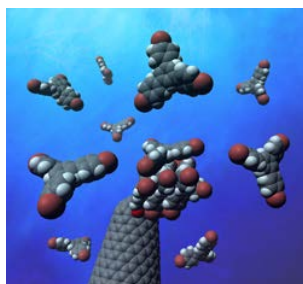
2. Chemical Kinetics Study through Observation of Individual Reaction Events with Atomic-Resolution Electron Microscopy, E. Nakamura,\* K. Harano, *Proc. Jpn. Acad., Ser. B* **94**, 428–440 (2018). (Selected as cover)



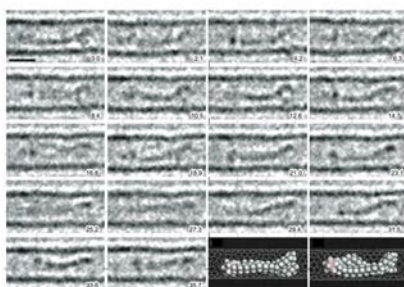
3. Interfacial Chemistry of Conical Fullerene Amphiphiles in Water, K. Harano,\* E. Nakamura,\* *Acc. Chem. Res.* **52**, 2090–2100 (2019).



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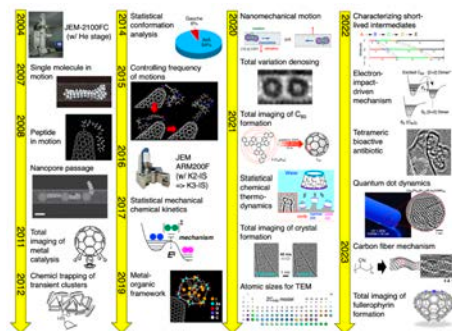


5. 分子映像によって開拓する動的分子科学の新しい世界, 原野幸治,\* 中室貴幸, 中村栄一,\* *顕微鏡*, **57(2)**, 59–64 (2022).

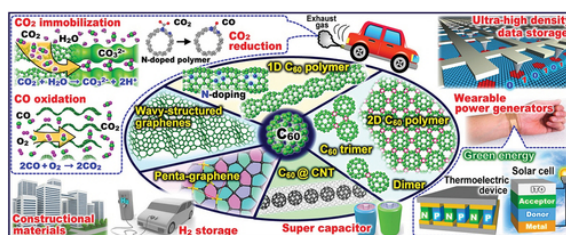


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## General Reviews:

1. 外部刺激に応答して伸縮する配位高分子錯体, 原野幸治, *化学と工業*, **58**, 593 (2005).  
Coordination polymer complexes showing stimuli-responsive stretching, K. Harano, *Kagaku to Kogyo (Tokyo, Japan)*, **58**, 593 (2005).
2. お茶のなかの分子世界, 原野幸治, *現代化学*, **556**, 42–45 (2017).
3. 原子分解能顕微鏡で化学反応機構を調べる！ – 一体いくつの分子を調べればよいのだろうか –, 岡田 賢, 山内 薫, 原野幸治, 中村栄一, *化学*, **73(4)**, 12–16 (2018).
4. 化学反応を顕微鏡で追跡する時代が到来, 岡田 賢, 山内 薫, 原野幸治, 中村栄一, *現代化学*, **566**, 27–31 (2018).
5. 目に見えない微結晶の構造を解析する！ – マイクロ電子回折で三次元分子構造を決定, 原野幸治, 劉 東欣, 中室貴幸, 中村栄一, *化学*, **74(5)**, 49–53 (2019).
6. アスファルテン分子の可視化, 原野幸治, *日本エネルギー学会機関誌えねるみくす*, **98**, 676–682 (2019).
7. 単分子原子分解能実時間電子顕微鏡法による化学反応研究, 原野幸治, 中村栄一, *化学と工業*, **73**, 16–18 (2020).
8. 世界最高速の動画撮影でひもとく分子の世界-カメラは見た!分子が動く決定的瞬間, 清水俊樹, 原野幸治, 中村栄一, *化学*, **75(11)**, 12–16 (2020)



9. シクロデキストリンの非包接型ゲスト認識, 原野幸治, *化学と工業*, **74**, 513 (2021).
10. 映像分子科学の現場から, 原野幸治, *化学と工業*, **74**, 875 (2021).
11. 高速・高分解能透過電子顕微鏡で開拓する原子・分子・分子集合体の化学, 原野幸治, 中室貴幸, 中村栄一, *NEW DIAMOND*, **38(2)**, 12–16 (2022).
12. 原子番号相関(ZC)分子模型の提案–新時代の化学教育・研究のための分子描画パラメータ, 原野幸治, 中村栄一, *化学*, **77(8)**, 36–40 (2022).

#### Books:

1. History and future prospect of  $\pi$ -electron research, K. Harano, E. Nakamura, *CSJ Current Review 12*, Kagaku Dojin, 20–24 (2013).  
 $\pi$  電子研究の歴史と将来展望 (分担執筆), 原野幸治, 中村栄一, 未来材料を創出する  $\pi$  電子系の化学 (CSJ カレントレビュー12), 化学同人, 20-24 (2013).
2. Conformational Analysis of Organic Molecules with Single-Molecule Atomic-Resolution Real-Time Transmission Electron Microscopy (SMART-TEM) Imaging, K. Harano, E. Nakamura, *Molecular Technology, Volume 4: Synthesis Innovation*, Wiley, 339-368 (2019).

#### Patents:

1. Preparation of fullerene derivatives by reacting fullerenes with silyl enol ether  
E. Nakamura, H. Isobe, K. Harano, S. Mouri, Y. Nakamura  
*Jpn. Kokai Tokkyo Koho* (2009) JP 2009185000 (特開 2009-185000)
2. Spherical water-dispersible amorphous particles and method for preparing same  
E. Nakamura, K. Harano, N. Inakoshi, C. Liu  
*PCT Int. Appl.* (2015) WO 2015137289
3. Preparation of silylfullerene derivative compound for semiconductor device, solar cell and solar cell module  
E. Nakamura, U. Takeda, K. Harano, S. Aramaki  
*Jpn. Kokai Tokkyo Koho* (2016) JP 2016210750 (特開 2016-210750)
4. Specifically shaped crystal of compound and method for producing same  
J. Sukegawa, D. Araki, S. Suzuki, M. Minami, T. Onai, F. Wakita, C. Liu, E. Nakamura, K. Harano  
*PCT Int. Appl.* (2020) WO 2020040233 (特願 2018-154760)
5. E. Nakamura, K. Harano, P. Ravat, R. Sekine, H. Uchida, K. Kamei  
特願 2021-105814 2021 年 6 月 25 日出願

### Invited Presentations:

1. 2005 Jun. 25, Symposium of Young Coordination Chemist's Association, Tokyo, Japan
2. 2006 Jun. 17, 1st Symposium on Grant-in-Aid for Scientific Research on Priority Area "Chemistry of Coordination Space" for Young Chemists, Osaka, Japan
3. 2007 Jun. 2, 24th Colloquium on Inorganic and Analytical Chemistry, Osaka, Japan
4. 2012 Feb. 20, Global COE lectureship at Tsinghua University, Beijing, China
5. 2012 Feb. 21, Global COE lectureship at Peking University, Beijing, China
6. 2012 Feb. 22, Global COE lectureship at Institute of Chemistry, Chinese Academy of Science, Beijing, China
7. 2012 Feb. 24, Global COE lectureship at Dalian University of Technology, Dalian, China
8. 2012 Feb. 28, Global COE lectureship at Xi'an Jiaotong University, Xi'an, China
9. 2012 Dec. 1, 6th International Symposium on Nanomedicine (ISNM2012), Matsue, Japan
10. 2013 Jun. 15, Japan-China young scientist symposium "Frontier of coordination chemistry at the interface of nano and micro", Okazaki, Japan
11. 2013 Jul. 7, Gordon Research Conference on Thin Film & Crystal Growth Mechanisms, Biddeford, USA
12. 2013 Nov. 7, 7th International Symposium on Nanomedicine (ISNM2013), Kitakyushu, Japan
13. 2014 Feb. 21, The 1st CMS International Symposium –New Waves in Self-Assembly for Optical/Electronic Functions–, Fukuoka, Japan
14. 2014 May 17, The 2nd Japan-China Symposium on Nanomedicine, Hiroshima, Japan
15. 2014 Jun. 20, Joint Congress of Asian Crystallization Technology Symposium-2014 (ACTS-2014) and 11th International Workshop on Crystal Growth of Organic Materials CGOM (CGOM11), Nara, Japan
16. 2014 Dec. 5, 8th International Symposium on Nanomedicine (ISNM2014), Matsuyama, Japan
17. 2015 Jan. 29, Lecture at Kanagawa University, Hiratsuka, Japan
18. 2015 Jun. 6, The Third China-Japan Joint Symposium on Inorganic and Nanomaterial Science, Beijing, China
19. 2015 Sep. 25, iCeMS International Symposium "Hierarchical Dynamics in Soft Materials and Biological Matter", Kyoto, Japan
20. 2015 Nov. 7, The 16th Daitokuba Physical Chemistry Seminar, Kusatsu, Japan

21. 2015 Dec. 10, Seminar, Heavy Oil Division, The Japan Institute of Energy, Tokyo, Japan
22. 2015 Dec. 11, The 5th Graphene Oxide Symposium, Okayama, Japan
23. 2016 Mar. 24, The 96th CSJ Annual meeting, Kyotanabe, Japan
24. 2016 Mar. 26, The 96th CSJ Annual meeting, Kyotanabe, Japan
25. 2016 Nov. 15, The 6th CSJ Chemistry Festa, Tokyo, Japan
26. 2016 Dec. 19, Special Lecture, Rikkyo University, Tokyo, Japan
27. 2017 Jan. 18, The Iron and Steel Institute of Japan, Tokyo, Japan
28. 2017 May 17, Intergroup Seminar, ETH Zürich, Zürich, Switzerland
29. 2017 May 19, Lecture, University of Zürich, Zürich, Switzerland
30. 2017 Jun. 24, Japan-China Joint Interdisciplinary Symposium on Coordination-based Hybrid Materials, Okazaki, Japan
31. 2017 Jul. 28, IRCCS Symposium for Young Scientists, Inuyama, Japan
32. 2017 Aug. 5, AIKOC-1, Nagoya, Japan
33. 2017 Sep. 6, 5th Forum for Young Scientists of Biological Chemistry, Tokyo, Japan
34. 2017 Oct. 19, The 7th CSJ Chemistry Festa, Tokyo, Japan
35. 2017 Nov. 17, The Japanese Society of Microscopy, Division of in situ Observation, Aichi, Japan
36. 2017 Dec. 5, Lecture of Polymer Science Chugoku and Shikoku Division 2017, Tottori, Japan
37. 2017 Dec. 9, Symposium for Young Coordination Chemists, Kumamoto, Japan
38. 2018 May 7, Kyushu University Nanotechnology Platform Seminar, Fukuoka, Japan
39. 2018 May 25, The China-Japan Workshop for Innovations in Molecular Science and Technology, Beijing, China
40. 2018 Nov. 10, The Japan Society of Vacuum and Surface Science, Kanto Tohoku Hokkaido Division Joint Seminar, Tokyo, Japan
41. 2018 Nov. 14, Chemistry Special Lecture, Tokyo University of Science, Japan
42. 2019 Feb. 8, PACCON 2019, Bangkok, Thailand
43. 2019 Feb. 11, CBC Seminar, Nanyang Technological University, Singapore
44. 2019 Feb. 21, The 43th Analysis Meeting of Osaka Industrial Research Association, Osaka, Japan
45. 2019 Mar. 8, International Symposium of Innovative Molecular Technology, Tokyo, Japan
46. 2019 Mar. 15, Users meeting of Bionet laboratory, Tokyo, Japan
47. 2019 May 11, Keio Organic Chemistry Symposium for Young Researchers, Yokohama,

Japan

48. 2019 Jul. 26, ISNA-18, Sapporo Convention Center, Sapporo, Japan
49. 2019 Aug. 8, Open Campus Public Lecture, The University of Tokyo, Tokyo, Japan
50. 2019 Aug. 30, SCAN TECH 2019, Tokyo City University, Tokyo, Japan
51. 2019 Sep. 13, Department Lecture, Ibaraki University, Hitachi, Japan
52. 2019 Oct. 22, School of Physical Science and Technology Seminar, ShanghaiTech University, Shanghai, China
53. 2019 Oct. 23, Department Lecture, Fudan University, Shanghai, China
54. 2019 Oct. 31, Programming Hierarchical Molecular Assemblies, Meiji University, Tokyo, Japan
55. 2019 Nov. 25, Special Lecture, Chongqing University, Chongqing, China
56. 2019 Dec. 7, Symposium for Young Coordination Chemists, Kanazawa, Japan
57. 2020 Mar. 24, The 100th CSJ Annual meeting, Tokyo University of Science, Noda, Japan
58. 2020 Jul. 10, Pre-symposium of Japan Society of Coordination Chemistry, Japan
59. 2020 Sep. 23, Kondo Memorial Foundation Research Report, online
60. 2020 Dec. 2, Catalysis Society of Japan, Hokkaido Branch Seminar, online
61. 2020 Dec. 8, MRM Forum 2020, online
62. 2021 Mar. 2, Department of Chemistry Lecture, Ochanomizu University, online
63. 2021 Apr. 28, The 15th Molecular Photoscience Q Colloquium, online
64. 2021 Jul. 16, Materials Science Lecture, Kitasato University, Sagami-hara, Japan
65. 2021 Sep. 22, The 31st Symposium on Physical Organic Chemistry, online
66. 2021 Oct. 3, KAUST Chemical Science Graduate Seminar, online
67. 2021 Nov. 2, Department Lecture, Laboratory for Chemistry and Life Science, Tokyo Institute of Technology, Yokohama, Japan
68. 2021 Nov. 25, Department Lecture, Saitama University, Saitama, Japan
69. 2021 Dec. 3, Tokai Conference, online
70. 2021 Dec. 8, Special Lecture, Chiba University, Chiba, Japan
71. 2021 Dec. 21, Pacificchem 2021, online
72. 2022 Jun. 30, The 161<sup>st</sup> AMCP Open Seminar, NIMS, Tsukuba, Japan
73. 2022 Jul. 1, Japan Analytical Instruments Active users Network, Mitsui LINK-Lab, Kashiwa, Japan
74. 2022 Jul. 14, 25<sup>th</sup> IUPAC International Conference on Physical Organic Chemistry (ICPOC 25), Hiroshima City Bunka Koryu Kaikan, Hiroshima, Japan
75. 2022 Jul. 29, GTR Seminar/The 76<sup>th</sup> Organoelement Seminar Series, Nagoya

University, Nagoya, Japan

76. 2022 Aug. 3, Microscopy & Microanalysis 2022, Oregon Convention Center, Portland, USA (on-demand presentation)
77. 2022 Aug. 29, Chem-Station 28<sup>th</sup> Virtual Symposium, online
78. 2022 Sep. 10, The 38<sup>th</sup> Cyclodextrin Symposium, Sonic City, Saitama, Japan
79. 2022 Oct. 20, The 12<sup>th</sup> CSJ Chemistry Festa, Tower Hall Funabori, Tokyo, Japan
80. 2022 Dec. 1, MRS Fall Meeting, Hynes Convention Center, Boston, USA
81. 2022 Dec. 20, iCeMS Seminar, Kyoto University, Kyoto, Japan
82. 2023 Mar. 4, The Japanese Society of Microscopy, Subcommittee on Ultra-High Resolution Microscopy, Maholova Minds Miura, Miura, Japan
83. 2023 Mar. 6, The Japan Society of Vacuum and Surface Science, Tohoku Hokkaido Division Joint Seminar, online
84. 2023 Jun. 19, Reaction Driving Symposium, Tokyo Institute of Technology, Tokyo, Japan
85. 2023 Jun. 24, Symposium for Young Coordination Chemists, Tokyo, Japan
86. 2023 Jun. 29, ICMAT2023, Singapore, Singapore
87. 2023 Oct. 19, JAIST Seminar, Japan Advanced Institute of Science and Technology, Nomi, Japan
88. 2023 Oct. 26, “Light chiral materials”-“Meso-hierarchy” Joint Symposium, Chiba University, Chiba, Japan
89. 2023 Dec. 8, The Society of Polymer Science Japan Kanto Division Kanagawa Area Symposium, Yokohama National University, Yokohama, Japan
90. 2024 Apr 23, EU-Japan Symposium on Emerging Nanomaterials for Photonics and Catalysis, Okinawa Institute of Science and Technology, Onna, Japan
91. 2024 Jun. 12, The 6th Coordination Chemistry Frontier Seminar, online.
92. 2024 Jun. 28, The 105th Chiba Regional Polymer Research Networking Lecture, Chiba Institute of Technology, Narashino, Japan
93. 2024 Jul. 29, The 55th Summer School for the Young Researchers in Structural Organic Chemistry, Hotel Fushio-kaku, Ikeda, Japan
94. 2024 Aug. 19, The 1<sup>st</sup> SmoleQ Workshop, Act City Hamamatsu, Hamamatsu, Japan
95. 2024 Sep. 10, The 19<sup>th</sup> SAT Research Meeting, Tsukuba International Congress Center, Tsukuba, Japan
96. 2024 Oct. 8, Department of Chemistry Zasshikai Seminar, Tohoku University, Sendai, Japan
97. 2024 Oct. 17, Young Researchers' Symposium, The Japanese Society of Microscopy,



Kyushu University, Kasuga, Japan