DIPARTIMENTO DI CHIMICA INDUSTRIALE
"TOSO MONTANARI"

Alle ore 15.00 del giorno **Venerdì 24 Maggio 2019**

presso Aula 9

del Dipartimento di Chimica Industriale "Toso Montanari"

il Prof. Yuichi Negishi

Department of Applied Chemistry

Tokio University of Science - Japan

terrà il seminario dal titolo:

Precise Synthesis and Application of Thiolate-Protected Metal Clusters

Tutti gli interessati sono invitati a intervenire

per informazioni
Prof. Stefano Zacchini

Il Direttore
Prof. Fabrizio Cavani

Precise Synthesis and Application of Thiolate-Protected Metal Clusters

Yuichi Negishi*
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Abstract

Thiolate (SR)-protected gold clusters ($Au_n(SR)_m$) show size-specific physical and chemical properties, such as photoluminescence, catalytic activity, and redox behavior, that are not observed in the case of bulk gold. Furthermore, it is possible to determine the geometrical structures of these clusters and therefore to elucidate correlations between their structures and physical properties. In addition, these clusters have been found to be highly stable both in solution and in the solid state. Owing to these numerous factors, $Au_n(SR)_m$ clusters are considered to have significant potential as constituent units of functional nanomaterials. To date, our research group has studied the following three aspects of $Au_n(SR)_m$ and related clusters: (1) the development of new methods allowing precise synthesis; (2) the establishment of new methods to impart high functionality; and (3) the utilization of these clusters as active sites in photocatalytic materials. This presentation summarizes our most recent work concerning these three subjects.

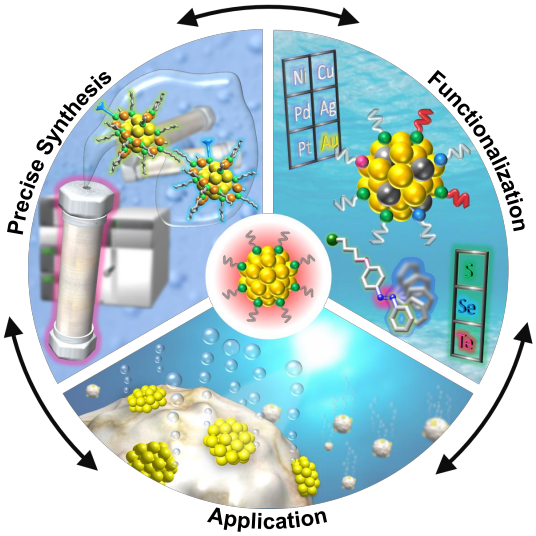

Figure 1. Graphical summary of the three aspects of our studies on thiolate-protected gold

Biography (Word limit 150)

Yuichi Negishi received his Ph.D. degree in 2001 from Keio University, Japan. He is the professor of Tokyo University of Science, Japan. He has over 140 publications that have been cited over 7,500 times. In his publications, 11 papers are/were categorized to Top 1% Cited Papers. His publication H-index is 45. He has been awarded several prizes, including the PCCP Prize (2007), CSJ Award for Young Chemists (2008), Japan Society of Molecular Science Award for Young Chemists (2012), and Yagami Prize (2017).

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Education
1996: B. S. Keio University, Japan
2001: Ph. D. Keio University, Japan

Professional Career
1998-2000: Assistant Professor, Department of Chemistry, Keio University, Japan
2000-2008: Assistant Professor, Institute for Molecular Science, Okazaki, Japan
2008-2013: Junior Associate Professor, Tokyo University of Science, Japan
2013-2017: Associate Professor, Tokyo University of Science, Japan
2017- : Professor, Tokyo University of Science, Japan

Prize:
2007 PCCP Prize for Outstanding Achievement of Young Chemists in Physical Chemistry and Chemical Physics (Royal Society of Chemistry)
2008 The Chemical Society of Japan Award for Young Chemists (Japan Chemical Society)
2012 Japan Society for Molecular Science Award for Young Scientists (Japan Society for Molecular Science)
2017 Yagami Prize (Keio University)

Selected recent publications:

- "Precise Synthesis, Functionalization and Application of Thiolate-Protected Gold Clusters" W. Kurashige, Y. Niihori, S. Sharma, and Y. Negishi, et al., ***Coord. Chem. Rev.*** **2016**, *320-321*, 238-250.
- "Understanding Ligand-Exchange Reactions on Thiolate-Protected Gold Cluster by Probing Isomer Distributions Using Reversed-Phase High-Performance Liquid Chromatography" Y. Niihori and Y. Negishi, et al., ***ACS Nano*** **2015,** *9*, 9347-9356.
- "A Critical Size for Emergence of Nonbulk Electronic and Geometric Structures in Dodecanethiolate-Protected Au Clusters" Y. Negishi, et al., ***J. Am. Chem. Soc.*** **2015**, *137*, 1206-1212.

Research Interests
Creation of Functionalized Metal Nanoclusters and Highly Active Photocatalytic Materials Using Thiolate-Protected Magic Gold Clusters: Advances in developments in nanotechnology have encouraged the creation of highly functionalized nanomaterials. Because of their nanoscale size (< 2 nm), thiolate-protected gold clusters ($Au_n(SR)_m$) exhibit size-specific physical and chemical properties not observed in bulk metals. Therefore, they have attracted attention as functional units or building blocks in nanotechnology. The highly stable, magic $Au_n(SR)_m$ clusters possess great potential as new nanomaterials. We are studying the following subjects related to magic $Au_n(SR)_m$ clusters: (1) establishing methods to enhance their functionality, (2) developing high-resolution separation methods and (3) utilizing the clusters as active sites in photocatalytic materials. Through these studies, we aim to create highly functional metal nanoclusters and apply them as highly active photocatalytic materials.