

10th World Congress on **Pharmacology**
&6th International Conference and Exhibition on**Advances in Chromatography & HPLC Techniques**

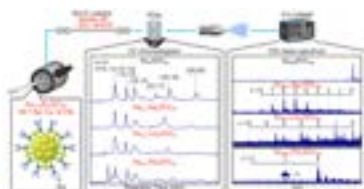
August 02-03, 2018 | Barcelona, Spain

High-performance liquid chromatography mass spectrometry of thiolate-protected metal clusters

Yuichi Negishi

Tokyo University of Science, Japan

Small thiolate-protected gold clusters have attracted considerable attention as new functional nanomaterials because they have size-specific properties and functions that are not found for bulk gold. In particular, hydrophilic thiolate-protected gold clusters (hereinafter referred to as hydrophilic gold clusters) exhibit high biocompatibility and luminescence quantum yield in addition to pollution-free properties. Therefore, hydrophilic gold clusters are expected to be used in biomedical and environmental applications. Replacing some of the Au atoms in these clusters with different elements may impart them with even more useful functions. However, the synthesis of hydrophilic metal clusters has been less studied because of the complexity involved in evaluating the mass distributions of product mixtures. In this work, we found two hydrophilic interaction liquid chromatography (HILIC) columns for high-performance liquid chromatography (HPLC) suitable for the high-resolution separation of hydrophilic metal clusters. The mass distributions of the product mixtures of hydrophilic metal clusters were evaluated via HPLC mass spectrometry (LC/MS) using these HILIC columns. Consequently, we observed multiple clusters that had not been previously reported for glutathionate (SG)-protected gold clusters ($Au_n(SG)_m$). Additionally, we demonstrated that $Au_{n-x}M_x(SG)_m$ alloy clusters ($M=Ag, Cu, \text{ or } Pd$) in which part of the Au in the $Au_n(SG)_m$ cluster is replaced by a hetero element can be synthesized, similar to the case of hydrophobic alloy clusters. It is easy to evaluate the mass distributions of hydrophilic metal clusters using this method. Thus, remarkable progress in the synthesis techniques of hydrophilic metal clusters through the use of this method is anticipated, as is the situation for hydrophobic metal clusters.

**Figure:** Schematic representation of this work**Recent Publications**

1. Y Negishi, et al., (2018) High-performance liquid chromatography mass spectrometry of gold and alloy clusters protected by hydrophilic thiolates. *Nanoscale* 10:1641-1649.
2. Y Negishi, et al., (2016) Precise synthesis, functionalization and application of thiolate-protected gold clusters. *Coordination Chemistry Reviews* (320-321) 238-250.
3. Y Negishi, et al., (2016) High-resolution separation of thiolate-protected gold clusters by reversed-phase high-performance liquid chromatography phys. Chem. Chem. Phys. (Perspective), 18:4251-4265.
4. Y Negishi, et al., (2015) Understanding ligand-exchange reactions on thiolate-protected gold clusters by probing isomer distributions using reversed-phase high-performance liquid chromatography. *ACS Nano*, 9:9347-9356.
5. Y. Negishi, et al., (2015) A critical size for emergence of nonbulk electronic and geometric structures in dodecanethiolate-protected au clusters. *J. Am. Chem. Soc.*, 137:1206-1212.

Biography

Yuichi Negishi has completed his PhD at Keio University, Japan. He is a Professor of Tokyo University of Science, Japan. He has over 140 publications that have been cited over 7,200 times. In his publications, 10 papers are 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).

negishi@rs.kagu.tus.ac.jp