Effects of PEG-modified ligands on the aggregation behaviors of Au_{25} cluster

(*[1]Graduate School of Environmental Science and [2]Faculty of Environmental Earth Science, Hokkaido University*) ○Xiaoyu Hu[1], Yuki Saito[1], Yukatsu Shichibu[1,2], Katsuaki Konishi[1,2]

Keywords: PEG modification, amphiphilic, Au clusters

The polymer-directed self-assembly of amphiphilic inorganic nanoscale compounds has emerged as a promising strategy for creating nanoparticle ensembles with enhanced collective properties.[1] When monomers are assembled into ordered structures, the resulting ensembles may exhibit unique physical and chemical properties distinct from individual compounds. In this study, we extended this approach by introducing amphiphilic ligands (PEG-alkanethiolate) into thiolate-stabilized Au_{25} clusters (Fig. 1), which are known as highly stable cluster species.

PEG-alkanethiolate ligands were selectively attached on the surface of Au_{25} clusters by conventional ligand exchange reaction. The UV-visible absorption spectra of the gold clusters in THF solutions exhibited variations upon increasing water content. dynamic light scattering measurements showed the growth of nanoscale objects with increasing water contents. Additionally, transmission electron microscopy (TEM) observations confirmed a distinct transformation of the aggregates, shifting from polygonal to circular shapes, as the proportion of water content increased (Fig. 2).

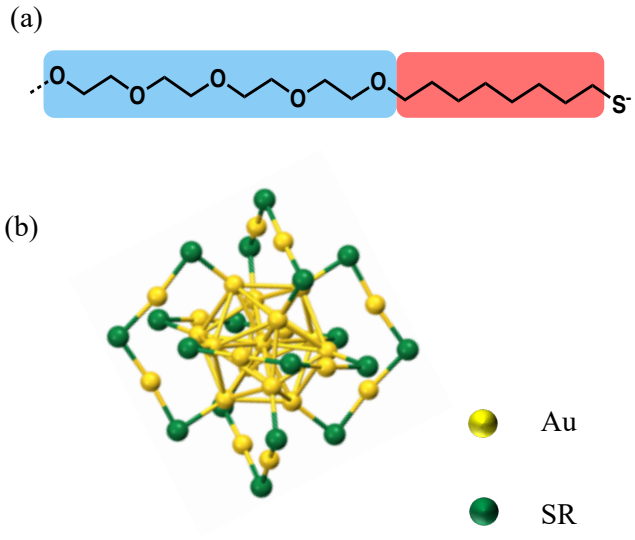

Fig. 1 Structures of (a) PEG-alkanethiolate (b) $Au_{25}(SR)_{18}$.

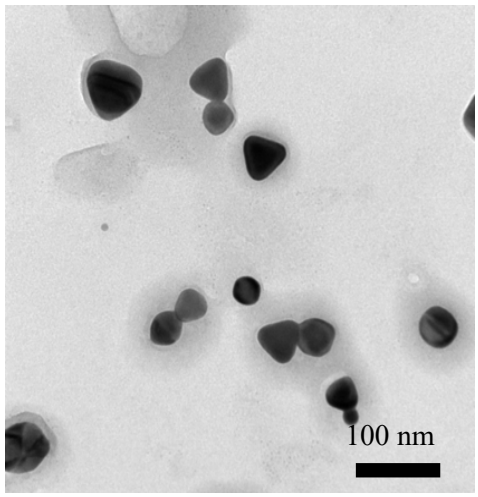

Fig. 2 TEM image of self-assembly.

1) C. Yi *et al.*, *Acc. Chem. Res.* **2017**, *50*, 12.

© The Chemical Society of Japan