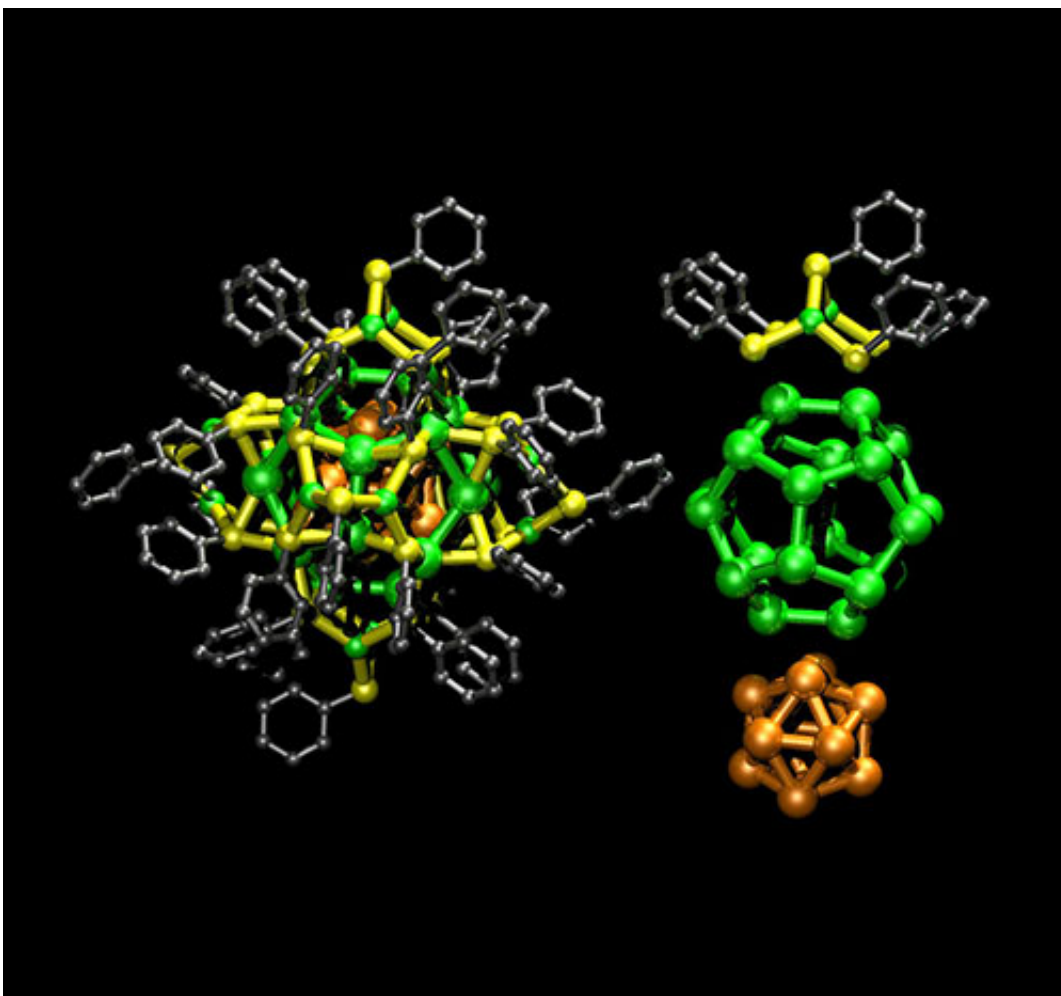


# New breakthrough for structural characterization of metal nanoparticles

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Credit: hakkinen1

Researchers at the Xiamen University in China and the University of

Jyväskylä in Finland have characterized a series of stable 1.5 nm metal nanoclusters containing 44 metal atoms, stabilized by 30 organic thiol molecules on the surface. Two types of clusters were synthesized, containing either 44 silver atoms or an intermetallic cluster of 12 gold and 32 silver atoms. The work in the University of Jyväskylä is funded by the Academy of Finland.

The special electronic structure of the clusters leads to peaked absorption of radiation in a wide region of ultraviolet and visible parts of the [electromagnetic spectrum](#). These novel [nanomaterials](#) were synthesized first in 2009 by a group at MIT in the USA, but their atomic structure has not been known until now. This is the first case of a very stable silver-based cluster nanomaterial that can be synthesized in a [macroscopic scale](#), currently of the order of 10 grams from one synthesis. This material is expected to be widely studied for optical, sensing and electron-transfer applications in the future. The results were reported online in *Nature Communications* on 4 September 2013.

The experimental work was done in Xiamen by the group of Professor Nanfeng Zheng and the computational work by the group of Professor Hannu Häkkinen in the University of Jyväskylä. The other researchers involved were Huayang Yang, Yu Wang and Huaqi Huang in Xiamen University and Lars Gell, Sami Malola and Lauri Lehtovaara in the University of Jyväskylä. The computations were made at the CSC – IT Centre for Science in Espoo, Finland, and at the HRLS-GAUSS Centre in Stuttgart, Germany.

**More information:** Yang, H. et al. All-thiol stabilized Ag<sub>44</sub> and Au<sub>12</sub>Ag<sub>32</sub> nanoparticles with single-crystal structures, *Nature Communications*, 4 September 2013. [DOI: 10.1038/ncomms3422](https://doi.org/10.1038/ncomms3422).

Provided by Academy of Finland

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