Biomimetic crystallization for long-pursued –COOH-functionalized gold nanocluster with near-infrared phosphorescence

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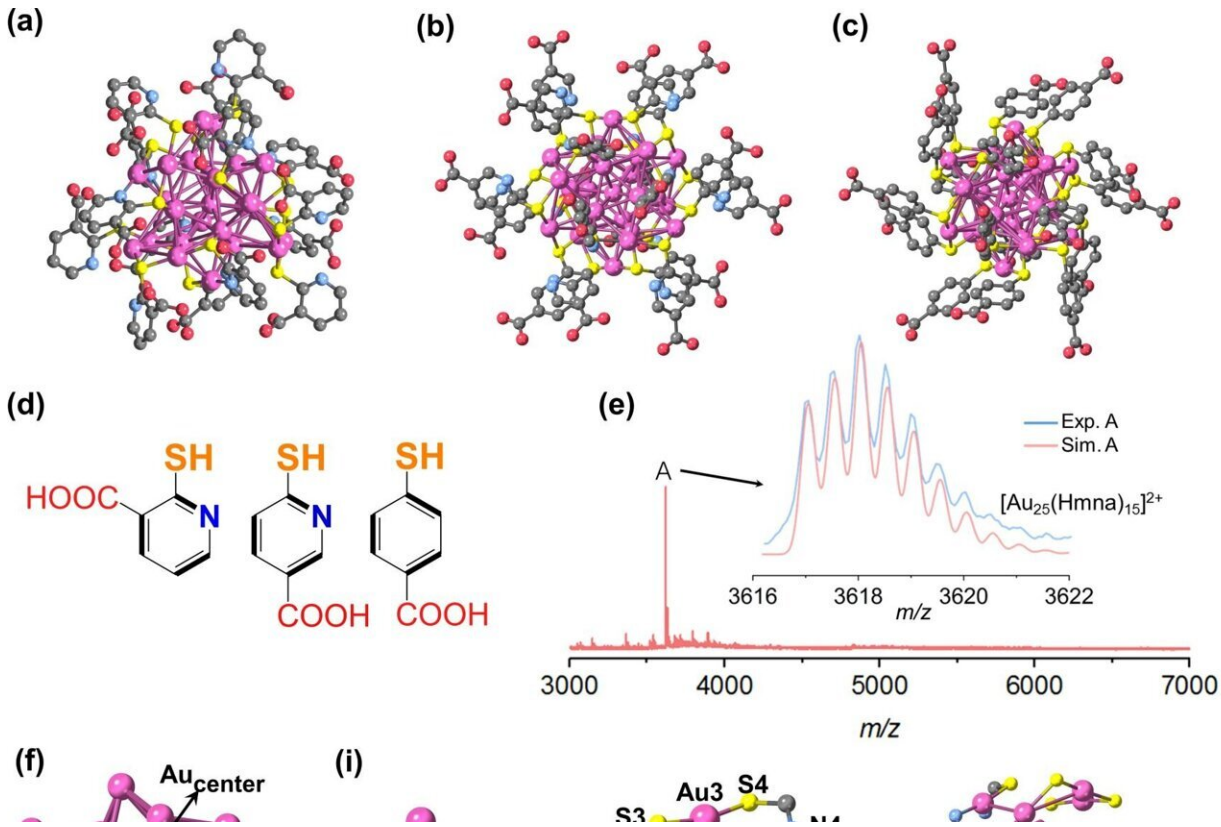

The total structures of Au25a (a), Au25b (b) and Au25c (c). (d) Molecular structures of 2-H_2mna, 6-H_2mna and *p*-MBAH. (e) ESI-MS of Au25a dissolved in H_2O/MeCN. Inset: the experimental (blue trace) and calculated (red trace) isotopic patterns of the molecular ion peak $[Au_{25}(Hmna)_{15}]^{2+}$. The Au_{25} frameworks in Au25a (f), Au25b (g) and Au25c (h). Anatomy of the crystal structures in Au25a (i), Au25b (j) and Au25c (k). Color codes: Purple, Au;

yellow, S; blue, N; gray, C. All hydrogen atoms, and some carbon tails of thiolate ligands are omitted for clarity. Credit: Science China Press

Recently, Professor Di Sun's group at Shandong University extended the salting-out method (commonly used to crystallize biological macromolecules, proteins, and DNA) to crystallize –COOH-functionalized AuNCs and obtained high-quality single crystals of three novel –COOH-functionalized Au_{25} nanoclusters, revealing the crystallographic structure of long-pursued –COOH-functionalized AuNCs.

This study not only demonstrates a facile approach for crystallizing –COOH-functionalized AuNCs, but also breaks the traditional perception of the structure of $Au_{25}(SR)_{18}$ and paves the way for investigating the correlation between their structures and properties.

"These new exciting results may be helpful for crystallizing protein-protected AuNCs, which have gained considerable attention in chemosensing or biosensing of cancer biomarkers, neurotransmitters, pathogenic microorganisms, biomolecules, pharmaceutical compounds, and immunoassays. This work will attract broad interest from the multi-disciplinary fields, including chemistry, biology, and materials," Di Sun says.

The study is published in the journal *Science Bulletin*.

More information: Wei-Dong Tian et al, Biomimetic crystallization for long-pursued –COOH-functionalized gold nanocluster with near-infrared phosphorescence, *Science Bulletin* (2023). DOI: 10.1016/j.scib.2023.11.014

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