Faradaurate Nanomolecules: A Superstable Plasmonic 76.3 kDa Cluster

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Introduction:

❖ Smaller nanoparticle such as Au_{10}, Au_{18}, Au_{19}, Au_{22}, Au_{25}, Au_{38}, Au_{102}, Au_{144} etc. are well characterized. This molecules have Step-like UV-vis feature.

❖ Characteristic plasmonic optical properties of nanoscale noblemetal particles has been limited, due in part to the problem of preparing homogeneous material for ensemble measurements.

❖In this paper, they have prepared homogeneous larger size nanoparticle of mass 76.3 kDa.

❖It is showing plasmonic feature.

Experimental section:

i) The solution-phase reduction of a Au(III) salt by thiolate and by borohydride; followed by

(ii) a variable-length thermo-chemical treatment (333 K, excess thiol, air); and

(iii) detection at each stage of the resulting distribution of clusters by mass spectrometry.

Results and discussion:

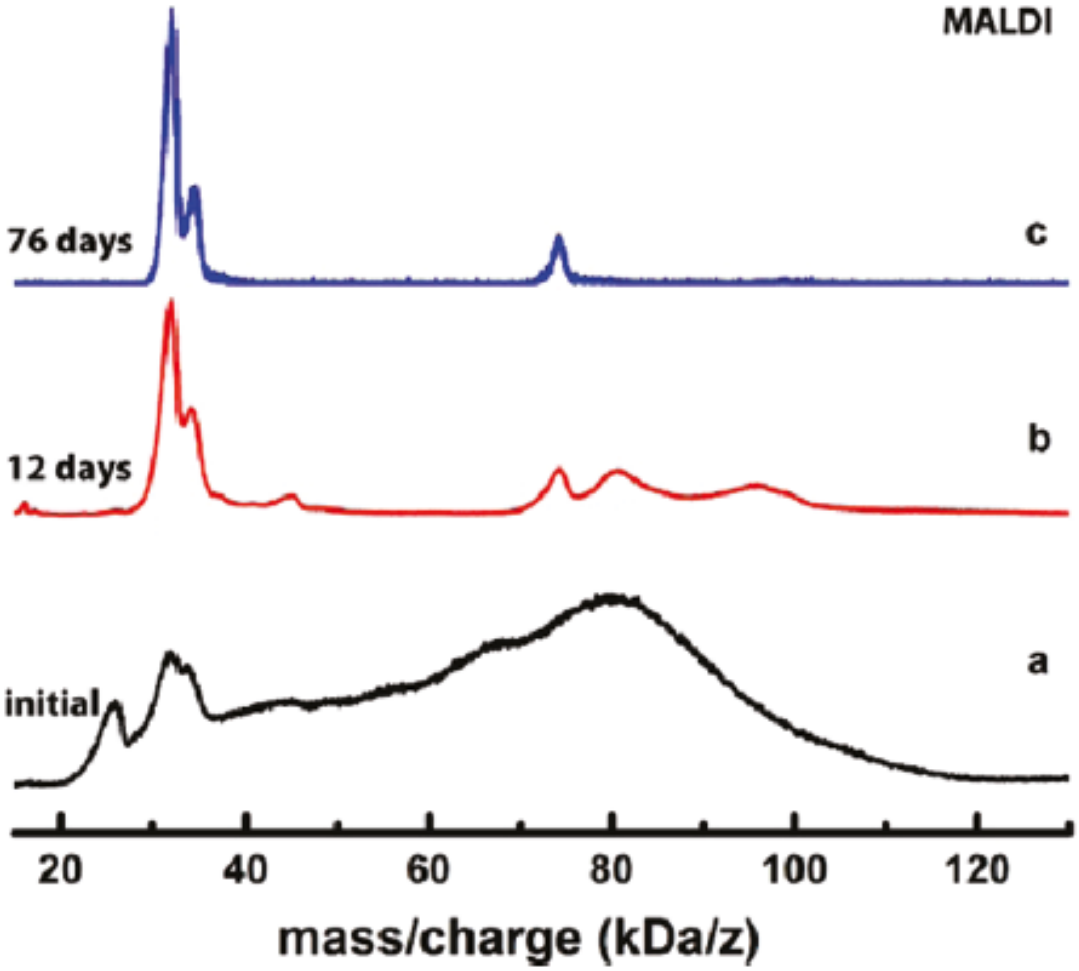

Figure 1. MALDI mass spectra of gold phenylethane thiolate cluster distributions evolving (a-c) under etching conditions (excess thiol, 60 C, air) from a broad polydisperse mixture leading up to homogeneous nanomolecules at 76 kDa.

Results and discussion:

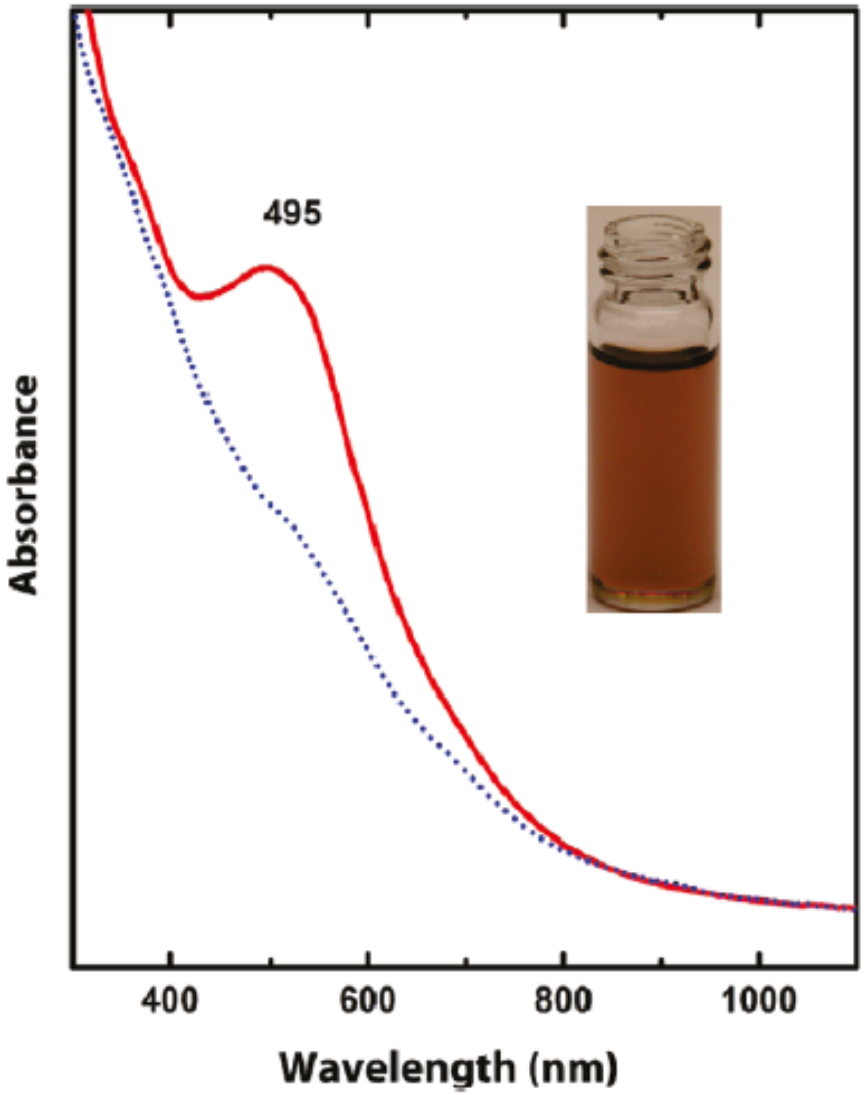

Figure 2. Plasmonic UV-vis spectrum of the 76.3 kDa nanomolecules(red curve) in toluene in contrast to the nonplasmonic $Au_{144}(SCH2CH2Ph)_{60}$ (dotted). Inset shows a photograph of the toluene solution of the nanomolecule

Results and discussion:

Repeated solvent fractionation with toluene and methanol yields pure nanomolecules in the ~76 kDa region

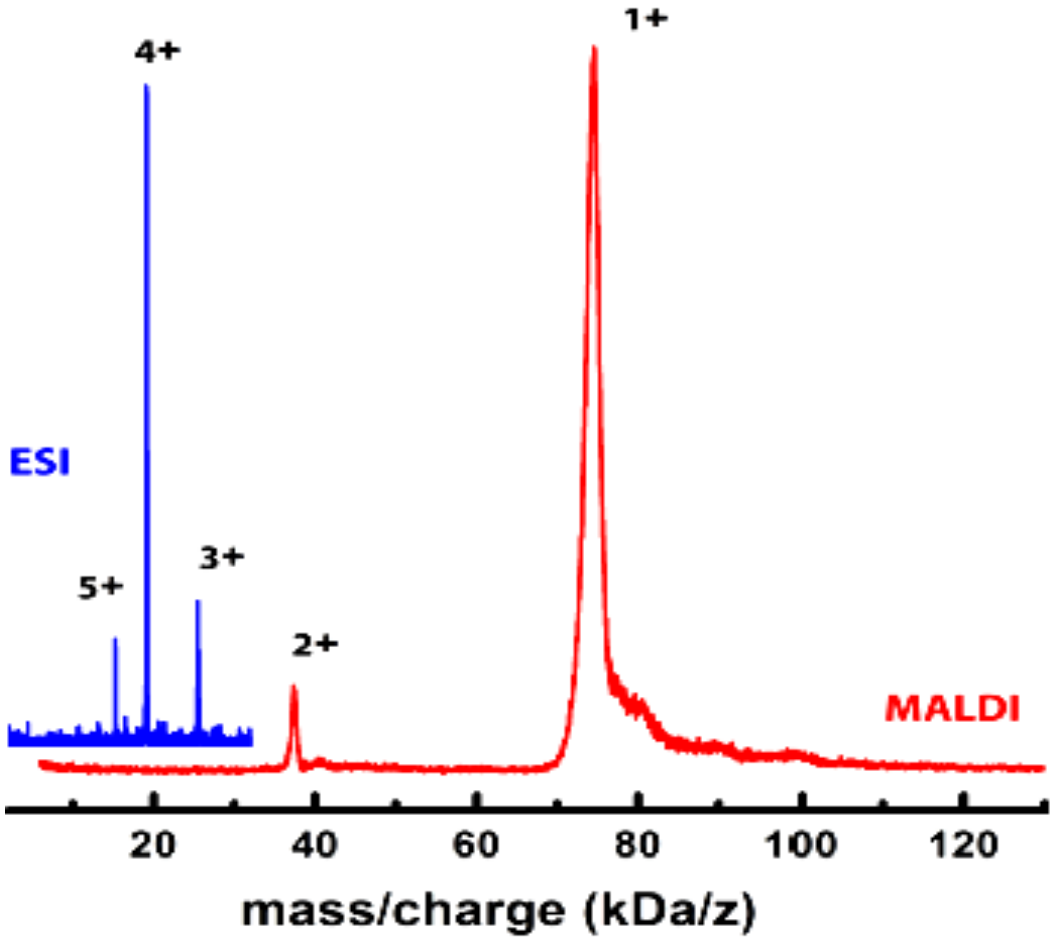

Figure 3. MALDI-MS (red) and ESI-MS (blue) of the 76.3 kDa thiolated gold nanomolecules showing 1+, 2+, 3+, 4+ and 5+ ions.

Conclusion:

They have reported the identification, isolation, and characterization of a 76.3 kDa phenylethane thiolate protected metal cluster compound far beyond any previously known in homogeneous molecular form and the first such compound to exhibit clear plasmonic properties.

Thank you