$Au_{38}Cu_1(SC_2H_4Ph)_{24}$ Nanoclusters: Synthesis, Enantioseparation and Luminescence

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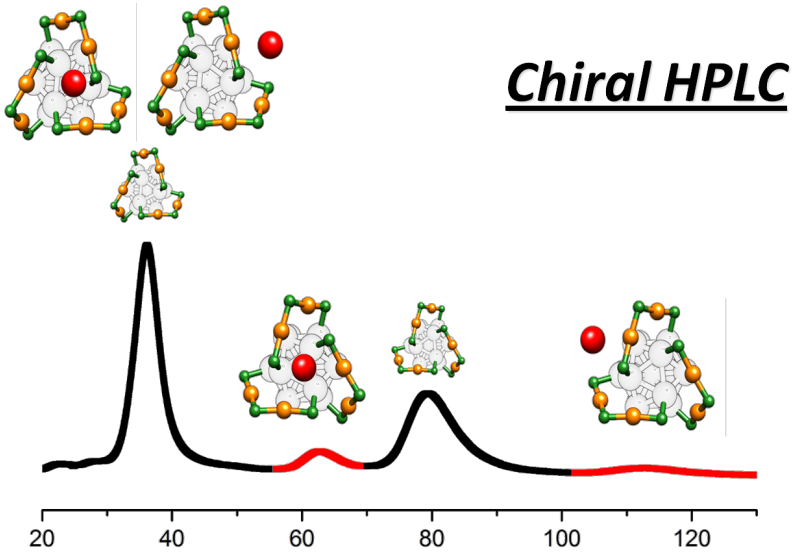
Gold alloy nanoparticles have recently triggered much research interest for their various applications in several fields such as catalysis and imaging. [1] Nonetheless, preparing alloy nanoparticles with atomic monodispersity has long been a major challenge, and until now only few have been attained with atomic precision and molecular purity. [2] In this study, a $CuAu_{38}$ bimetallic nanocluster was synthesized by adding a single copper atom to the $Au_{38}(2\text{-PET})_{24}$ nanocluster. The absence of $Cu_xAu_{38}(2\text{-PET})_{24}$ doped species was demonstrated by MALDI-TOF mass spectrometry. A separation of bimetallic clusters was attained for the first time where isomers of the E2 enantiomer of the $Au_{38}Cu_1$ adduct were successfully isolated from their parent cluster using chiral HPLC. The CD of the isolated isomers revealed a change in their electronic structure upon copper addition. The luminescence of the $Au_{38}Cu_1$ adduct is significantly enhanced in comparison with the parent Au_{38} nanocluster. The stability of the newly formed adduct is strongly dependent on the coexistence of the Au_{38} nanoclusters.



[1] C. Yao, J. Chen, M. B. Li, L. Liu, J. Yang and Z. Wu, Nano Letters, **2015**, 15, 1281-1287.
[2] S. Wang, Y. Song, S. Jin, X. Liu, J. Zhang, Y. Pei, X. Meng, M. Chen, P. Li and M. Zhu, Journal of American Chemical Society, **2015**, 137, 4018-4021.