

Gold Cluster Research May Help Improve Air Quality

An important discovery made by researchers at EMSL may ultimately help to reduce air pollution and improve the health of people and the environment.

Scientists at PNNL and Washington State University, using EMSL's organic synthesis laboratory, mass spectrometer, high-speed computer cluster, and high resolution transmission electron microscope, confirmed the discovery that gold clusters consisting of 20 Au atoms, can be synthesized by wet chemistry methods.

Gold clusters, normally composed of up to several hundred gold atoms and typically having dimensions of several nanometers, show unique catalytic properties when reduced to a size smaller than ~3 nanometers. These catalytic properties include oxidation of CO to CO₂, which is an important process in improving air quality.

Scientists were able to synthesize the tetrahedral Au₂₀ gold cluster in solution, bonded with triphenyl phosphine ligands. "The results, obtained based on experimental and theoretical observations, suggest that large quantities of ligand-stabilized tetrahedral Au₂₀ can be obtained, opening the door for exploring its anticipated novel chemical, optical, and catalytic properties," says Chongmin Wang, one of the investigators of this project at EMSL.

"The combinatorial analytical methods in EMSL provided the ideal tool for the success of this project," says Wang.

The research was featured on the cover of the August 2004 issue of the *Journal of Physical Chemistry*.

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