Highlight: Damping of acoustic vibrations in gold nanoparticles

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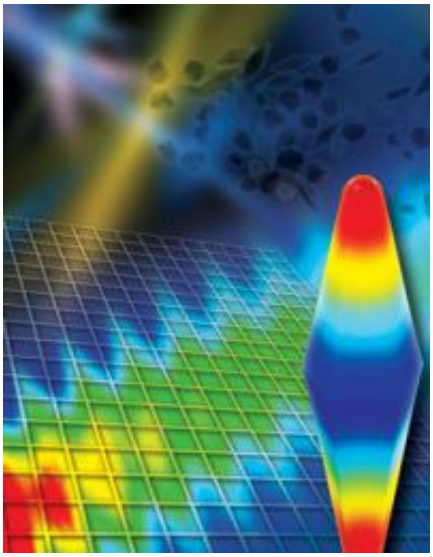

Vibrations in nanostructures offer applications in molecular-scale biological sensing and ultrasensitive mass detection. To approach single-atom sensing, it is necessary to reduce the dimensions of the structures to the nanometer scale while preserving long-lived vibrations.

This requires an understanding of how vibrations in nanoscale objects are damped - or lose their energy to the fluid surroundings and within themselves. Researchers have used fast laser pulses to produce and probe high-frequency vibrations in metal nanoparticles. However, significant

variations in particle dimensions complicate measurements.

By studying bipyramid-shaped gold nanoparticles with highly uniform sizes and shapes, researchers in CNM's Nanophotonics Group working with colleagues at the University of Melbourne and the University of Chicago, have overcome this limitation. They have isolated the portion of damping due to the surrounding liquid and developed a quantitative parameter-free model.

This measurement technique should be applicable to a broad range of nanoparticles in different environments, making it possible to study the physical processes responsible for mechanical losses on the nanometer scale.

More information: M. Pelton, J. E. Sader, J. Burgin, M. Liu, P. Guyot-Sionnest, and D. Gosztola, "Damping of acoustic vibrations in gold nanoparticles," Nat Nano, 4 (8) pp. 492-495, 2009 (online)

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