

Synthesis of Au-Ag nano-hybrids to investigate heat transfer

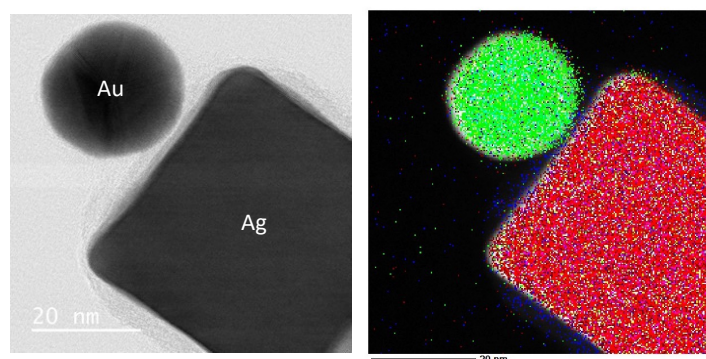
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Abstract: The modalities of energy transfer at the nanoscale strongly differ from those at the macroscopic scales because of the increased role played by interfaces. With the development of nanotechnology, understanding and mastering these mechanisms is crucial for fundamental and technological advances in many fields such as electronics, thermoelectricity or sensing [1]. In this communication, we will show how with self-assembly approaches, we can construct hybrid nano-systems with well-defined geometry and stability to investigate the modalities of heat transfer in the time domain phonon transport at single particle level [2]. Strong coupling and precise positioning between plasmonic nano-units can be achieved via regioselective surface modification. Self-assembly approaches, in particular based on electrostatic interactions, endow the assembly of nanoparticles of different size, shape, composition into desired structures. We will investigate how the internal thermalization and the cooling dynamics within the nano-hybrids are affected by their geometry by exploitation of pump-probe optical spectroscopy.



Example of a nano-hybrid cluster made from assembly of colloidal building blocks with control size, shape and positioning.

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References

1. Snyder G. J., Toberer E. S., “Complex Thermoelectric Materials”. *Nat. Mater.* Vol. 7, 105-114, 2008
2. Rouxel R., Diego M., Medeghini F., Maioli P., Rossella F., Vallée F., Banf F., Crut A., Del Fatti N. « Ultrafast Thermo-Optical Dynamics of a Single metal Nano-object.” *J. Phys. Chem. C*, Vol. 124, 15625-15633, 2020.