[Opto-thermoelectric nanotweezers]

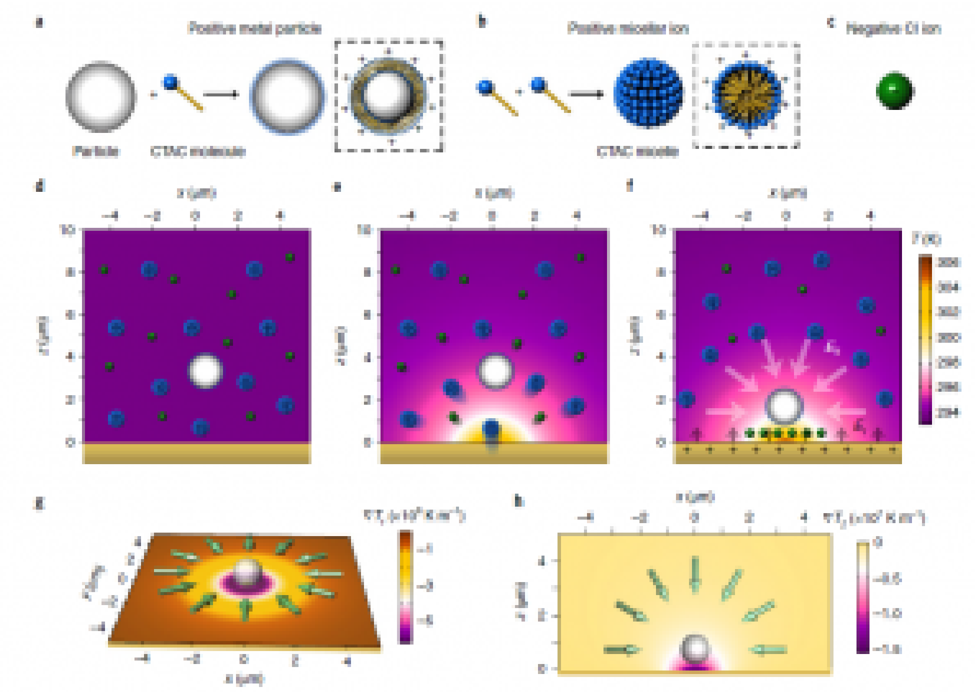

Fig. 1 | Working principle of OTENT. **a**, Surface charge modification of a metal nanoparticle by CTAC adsorption. **b**, Formation of CTAC micelles. **c**,Schematic view of a Cl− ion. **d**, Dispersion of a single metal particle and multiple ions in the solution without optical heating. **e**, Thermophoretic migrationof the ions under optical heating. **f**, Steady ionic distribution under optical heating generates a thermoelectric field *E*T for trapping the metal nanoparticle.The repulsive electric field *E*r arises from the positive charges of thethermoplasmoic substrate and balances *E*T. **g**, Simulated in-plane temperature gradient ∇*T*r and direction of the corresponding trapping force. **h**, Simulated out-of-plane temperature gradient ∇*Tz* and direction of the corresponding trappingforce. The incident laser beam in **e**–**h** has a diameter of 2 μ m and an optical power of 0.216 mW. The green arrows in **g** and **h** show the direction of the trapping force.

Optical manipulation of plasmonic nanoparticles provides opportunities for fundamental and technical innovation in nanophotonics.Optical heating arising from the photon-to-phonon conversion is considered as an intrinsic loss in metal nanoparticles, which limits their applications. this group show that this drawback can be turned into an advantage, by developing an extremely low-power optical tweezing technique, termed opto-thermoelectric nanotweezers. By optically heating a thermoplasmonic substrate, a light-directed thermoelectric field can be generated due to spatial separation of dissolved ions within the heating laser spot, which allows us to manipulate metal nanoparticles of a wide range of materials, sizes and shapes with single-particle resolution. In combination with dark-field optical imaging, nanoparticles can be selectively trapped and their spectroscopic response can be resolved in situ. With its simple optics, versatile low-power operation, applicability to diverse nanoparticles and tunable working wavelength, opto-thermoelectric nanotweezers will become a powerful tool in colloid science and nanotechnology.

more information on:

[1]	M. W. X. P. E. N. L. Z. M. Linhan Lin1, “Opto-thermoelectric nanotweezers,” *nature photonics,* vol. 12, pp. 195-201, 2018, https://doi.org/10.1038/s41566-018-0134-3.