

## LIGHT AND THERMAL EFFECTS INDUCED FORCES IN THE LIGHT-NANOPARTICLE INTERACTION PROCESS

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**ABSTRACT.** Plasmonic optical tweezers have excellent potential in the manipulation and capture of nanoparticles. The heat generated by the absorption of laser by nanoparticles will affect the capture stability of nanoparticles. Therefore, it is particularly important to analyze the force of nanoparticles in the multi-physical field induced by the photothermal effect. This work investigated the scale of different forces acting on nanoparticles induced by the photothermal effect. We calculated the distributions of optical force, thermophoretic force, and thermo-osmotic force of nanoparticles and analyzed the effects of various forces on the capture process. And then the influence of thermal conductivity and laser power on the forces were investigated. It shows that optical force and thermo-osmotic force are beneficial to the capture stability of nanoparticles and thermophoretic force inhibits the capture of nanoparticles. This study provides theoretical support for the precise manipulation and efficient trapping of nanoparticles.

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