

Light-induced particle repulsion from epsilon near-zero thin film

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Among the numerous capabilities and potential application of epsilon near-zero (ENZ) materials, the repulsion of dipoles or polarizable particles due to the electrical field expulsion it is a relatively new and unexplored field. Optical tweezers can be used to sense and measure the repulsion force acting on the optically trapped particle in proximity of the ENZ thin film, when exposed to a polarising light beam. Our work represents one of the first experimental examples of measuring such forces on a microsphere. The experiment was performed in front of different material surfaces and the results were compared to what obtained in the case of ENZ surface. The preliminary results we obtained showed the effect of the ENZ material in terms of optical forces acting on the particle. Our work aims to provide an innovative method to manipulate objects ranging from microparticles down to single molecules.