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Design and construction of a counter propagating optical trap for aerosol droplets.

Micron-sized aerosol droplets can be trapped in air using a counter propagating optical trap. This allows the stationary droplet to be studied. In this work, the aim is to use the scattering of broadband white light from the trapped droplet and Mie theory to study the droplet's morphology. To create the optical trap, two long working distance high numerical aperture microscope objectives focus two counter propagating beams into a sample chamber. The foci of the two beams are overlapped in space and the droplet is trapped at this position. The focusing of the light through the objective creates a gradient force due to the refraction of the light through the droplet since the droplet has a higher refractive index than the surrounding medium. To enable trapping the droplet at a longer distance from the objectives, as necessitated by the sample chamber configuration, longer working distance objectives are used. The objectives have lower numerical apertures and therefore weaker gradient forces are created. To ensure a stable trap and to overcome the scattering forces that the droplet undergoes, two counter propagating beams are used. Here, salt-water aerosol droplets are trapped in air using a near infrared trap laser. The design and construction of the counter propagating optical trap as well as preliminary trapping results will be discussed.

Apply to be considered for a student ; award (Yes / No)?

yes

Level for award;(Hons, MSc, PhD, N/A)?

PhD

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