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Aberrated Optical Tweezers For Manipulation Of Nanoparticles SAMARENDRA MOHANTY, KUNAL TIWARI, UT Arlington — Asymmetry leading to aberrations is the most unwanted parameter in optics, especially while working on a microscopic system such as optical tweezers using high numerical aperture microscope objectives. While considerable efforts are being made to minimize aberrations in optical tweezers for stable trapping, optical tweezers that are asymmetric in size along transverse directions due to astigmatic beams, enabled controlled rotation of microscopic objects. More interestingly, adding further aberrations (such as coma) in the intensity profile of the asymmetrically shaped optical tweezers, even more complex tasks such as parallel transport of microscopic objects has been achieved. Here, we report transport of dielectric nanoparticles of different sizes using aberrated optical tweezers. The aberrated optical tweezers was generated by using Gaussian output from Ytterbium fiber laser which was first stretched using a cylindrical lens and subsequent aberrations were introduced by either tilting the beam with respect to the microscope objective or by use of an additional lens. We could generate the asymmetric potentials selectively in a controlled way in X and or Y-directions over an extended spatial region. This development would further facilitate the growing use of optical tweezers for mixing as well as sorting at nano level.

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