Proceedings of SPIE 11238, Optical Interactions with Tissue and Cells XXXI, 1123804, San Francisco, California, February 2020

Characterisation of a Bessel beam optical cell sorting system using microspheres

Lugongolo, Masixole Y; Ombinda-Lemboumba, Saturnin; Manoto, Sello L and Mthunzi-Kufa, Patience

Abstract:
Accurate sorting of specific particles in a mixed population is a desirable capability in the field of biomedical sciences. This enables researchers to purify samples by selecting only the particles of interest. Optical sorting is achieved by using a Bessel beam, which is a non-diffracting, propagation invariant light pattern consisting of concentric rings around a bright central core. This type of beam profile has the ability to employ optical forces in manipulating matter in a sterile environment without physical interaction. The concentric rings enable the simultaneous manipulation of particles of various characteristics in multiple planes due to the different power intensity distributions. Sorting with Bessel beam is an attractive approach using small sample volumes (microliter ranges), which becomes beneficial when working with rare particles of interest and in small samples. In this study a home built Bessel beam optical sorting setup was used to sort polystyrene and silica microspheres of different sizes and refractive indices. Our preliminary results showed that the polystyrene microspheres travelled quicker than the silica type of spheres with the same size due to the high refractive indices. These findings indicate the potential application of sorting different cells with varying refractive indices such as differentiating HIV infected cells from uninfected cells.