Trapping and Rotating Micro Strip Particles by Optical Tweezers

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Abstract: We construct a single-beam optical tweezer which can trap a birefringent micro strip particle, and produce fast self-rotations. Furthermore, we show the technique of manually rotating a micro strip particle by a reformed dual-beam optical tweezer.

Keywords: optical tweezer, rotation, dual beams

Summary

We use a linearly polarized green laser of wavelength at 532 nm to construct a flexible optical tweezer. In this conventional single-beam optical tweezer system, we have found that a trapped birefringent polystyrene micro strip particle may fast self-rotate along its two principal axes (Fig. 1) due to the anisotropy in polarizability [1].

Nevertheless, by inserting a cover glass into half the laser beam and adjusting the phase difference between the two semi-beams, we can obtain closely spaced dual beams at the laser focus, such that we can manipulate and rotate the micro strip particle (Fig. 2) by rotating the cover glass to change the angular displacement of the two split beams [2,3].

In conclusion, the controlled rotation of a trapped micro strip particle is achieved using an easy-to-reform dual-beam optical tweezer.

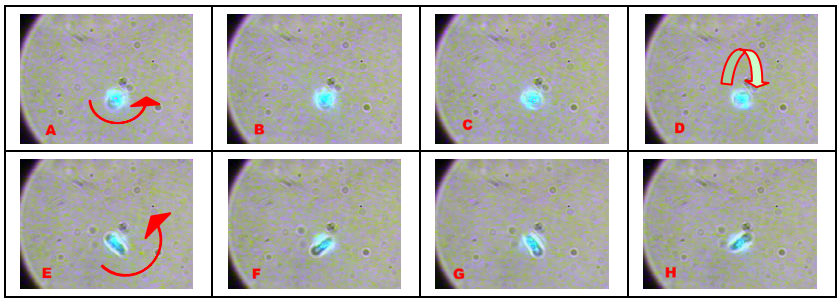

Fig. 1. The self-rotations of a birefringent polystyrene micro strip particle trapped by a single-beam optical tweezer along two principal axes, respectively.

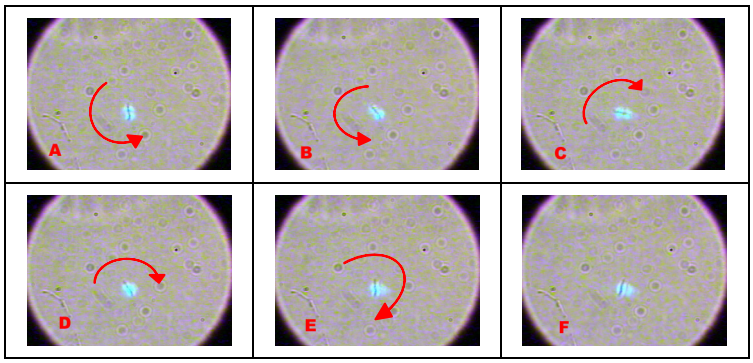

Fig. 2. The controlled rotation of the micro strip particle trapped by a dual-beam optical tweezer.

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