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In-depth trapping and fluorescence excitation of microscopic objects using single optical fiber tweezers MERVYN PINTO, DONDRE ROSE, NINAD INGLE, SAMARENDRA MOHANTY — Fluorescence analysis of microscopic objects in suspension is of considerable interest. However, imaging and spectroscopy of motile samples in suspension requires immobilization of the sample, thereby perturbing the sample conformation. Though optical tweezers can hold microscopic samples without any physical contact, it has very short working distance, thus limiting its applicability to large depths. We report on trapping of microscopic objects at depths of few cm using single fiber optical tweezers developed by use of a microfabricated fiber tip and cw green laser beam. The micro-axicon tip was fabricated by chemical etching of single mode as well as multimode fiber. The fiber tweezers beam can simultaneously excite the trapped objects to emit fluorescence. While single mode fiber tweezers provided better trapping stability, the multi mode fiber tweezers is found to be more robust. Fluorescence imaging of trapped object inside a cuvette at depths of few cm was carried out using a side-viewing long-working distance microscope objective. A 2x2 fiber optic splitter allowed coupling of the single mode fiber tweezers beam onto one of the input arms and the fluorescence being collected by the other arm. The use of optical trapping using single fiber optical tweezers and fluorescence excitation, together will pave the way for analysis of suspended samples at large depths.

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