

Abstract Submitted
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Multiplexed Fluorescence Spectroscopy with Holographic Optical Tweezers MATTHEW CIBULA, DAVID MCINTYRE, Oregon State University — We are developing a multiplexed spectroscopy system which employs holographic optical tweezers to manipulate trapped sensor particles and an imaging spectrometer to simultaneously detect their fluorescence spectra. This system has potential applications to studying the internal or external environment of cells undergoing chemical reactions. Sensor particles incorporating quantum dots or fluorescent dyes are capable of monitoring environmental properties such as pH, ion concentration, temperature, and voltage by observing related changes in the sensor's fluorescence spectrum. A spatial light modulator controls the positions of infrared optical traps to manipulate sensors into regions of interest. The sensors are excited with a 532-nm laser source and the fluorescence of spatially separated sensors is detected on the spectrometer. The spectrometer aperture must remain open to view multiple sensors, so the spectral resolution is limited by the size of each sensor and the spectral data for each sensor are calibrated using the zeroth-order image. We will demonstrate the capabilities of our system by coating microspheres with quantum dots and measuring the spectral shift with respect to a change in temperature.

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