Multiplexed fluorescence spectroscopy with holographic optical
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MCINTYRE, Oregon State University — We present a multiplexed spectroscopy
 technique using holographic optical tweezers to trap and excite multiple sensor par-
ticles. Our goal is to develop a lab-on-a-chip measurement platform for monitoring
pH and other ion concentrations with high spatial resolution in a microfluidic device
or within biological cells. We have developed a variety of polymeric pH/ion sensitive
nanoparticles with fluorescence spectra that change with the pH/ion concentration of
the surrounding environment. We optically trap and manipulate multiple nanosen-
sors using holographic optical tweezers. The trapped particles are irradiated with
a separate excitation laser and the fluorescence from all the particles is detected
simultaneously with an imaging spectrometer. Electronic separation of the parallel,
discrete spectra allows for concurrent determination of multiple spectra.

\textsuperscript{1}Supported by ONR grant N00014-07-1-0457.