Presentation

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Fluorescence microscopy with a single-pixel camera and derivative optical imaging technique

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Abstract

In biology, fluorescence microscopy has been widely explored for imaging due to the possibility of new contrasts, contrast enhancements, specific molecule detections, etc. Moreover, due to our eyes and cameras detection range, most of the fluorescence microscopy works in the visible. However, it is interesting to see other wavelengths where no multi-array cameras are available and only single-pixel detections are possible like one, for example, by laser beam scanning methods where a focal point produced by a spherical lens is scanned to generate an image point-by-point. In order to improve the image acquisition speed, it is possible to use a focal line produced by a cylindrical lens to reduce the scanning along one axis perpendicular to the laser beam line. In this context, here we present an focal line imaging method based on the signal derivative. Specifically, we obtain a fluorescent sample's image line using a simple approach we call the derivative optical imaging technique (DOIT). As a proof of principle, we did fluorescent images of stained and unstained onion cells, for instance, using a low-power CW 532 nm laser. Image acquisition time and resolution are discussed.

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