

# **Diffuse optical spectroscopy with very high collection efficiency**

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## **ABSTRACT**

Diffuse light emanates from biological tissue over large solid angles and hence it cannot be efficiently collected by the low numerical apertures of conventional spectrometers. In order to improve efficiency, we propose to employ broadband light that is dispersed into a number of wavelength bands that are coded with a spatial light modulator. Subsequently, these bands are spatially recombined before being delivered to the tissue. With this method, light from the tissue can be detected with a high numerical aperture, single-element photodetector and spectrally resolved by demodulation. Effective use of the limited gain bandwidth of the amplifier can be obtained by feedback to the spatial light modulator. In principle, spectroscopic imaging does not require more than a number of photodetectors to build up the image.

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