Title:	Photomechanical detection of bioaerosol fluorescence free-from solar background Author links open overlay panel
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Keywords:	Photomechanical bioaerosol fluorescence free-from solar
Issue Date:	2022
Publisher:	Elsevier
Citation:	Optics and Laser Technology, 155(1), 45048.
Abstract:	Detection of biological molecules in aerosol via fluorescence signature is well established. However, standoff detection of weak target fluorescence deeply submerged in the ambient bright solar background is challenging with conventional approaches (using photo-multiplier tubes, avalanche photodiodes or ICCD) due to saturation effects and overlapping spectral signatures. Here, we demonstrate a Quartz tuning fork (QTF) enhanced photomechanical detection of fluorescence spectra from bio-aerosols free from broadband solar light. The detection is based on resonant excitation of QTF at 32.78 kHz by on–off modulated laser-induced fluorescence from aerosol while the stray solar background is essentially suppressed by the QTF. A remote detection of fluorescence spectra of Bacillus Globbigi and Riboflavin aerosols was demonstrated at 5 m standoff distance using two near-UV excitation wavelengths with good signal-to-noise ratio. The fluorescence signal increases linearly with excitation power, concentration and quality factor of the QTF. Besides being low-cost and reliable, the detection range of the presented approach can be extended to large standoff distance free-from ambient sunlight noise.
Description:	Only IISER Mohali authors are available in the record.
URI:	https://doi.org/10.1016/j.optlastec.2022.108564 (https://doi.org/10.1016/j.optlastec.2022.108564) http://hdl.handle.net/123456789/4865 (http://hdl.handle.net/123456789/4865)
Appears in Collections:	Research Articles (/jspui/handle/123456789/9)

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