

# Author's Accepted Manuscript

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PII: S0039-9140(18)30574-5  
DOI: <https://doi.org/10.1016/j.talanta.2018.05.082>  
Reference: TAL18723

To appear in: *Talanta*

Received date: 9 April 2018  
Revised date: 19 May 2018  
Accepted date: 24 May 2018

Cite this article as: Mengtian Li, Shixu Huang, Kailai Xu, Xiaoming Jiang and Xiandeng Hou, Miniaturized Point Discharge-Radical Optical Emission Spectrometer: A Multichannel Optical Detector for Discriminant Analysis of Volatile Organic Sulfur Compounds, *Talanta*, <https://doi.org/10.1016/j.talanta.2018.05.082>

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# Miniaturized Point Discharge-Radical Optical Emission Spectrometer: A Multichannel Optical Detector for Discriminant Analysis of Volatile Organic Sulfur Compounds

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**Abstract:** In this work, we proposed a miniaturized point discharge-radical optical emission spectrometer (PD-RES) as a multichannel optical detector for discriminant analysis of various volatile organic sulfur compounds (VOSCs). Under appropriate experimental conditions, the unique molecular emission of CS radical in the vicinity of 257.6 nm was recorded, as well as the atomic emission lines of C at 193.1 nm and 247.8 nm, the molecular emission of C<sub>2</sub> radical around 231.5 nm and CN radical nearby 384.8 nm. They were utilized as five optical channels for precise qualification and discrimination. Linear discriminant analysis (LDA) and principal component analysis (PCA) further demonstrated the robustness of this detector for discriminant analysis: 95 unknown samples from ten typical VOSCs were classified with accuracy of 98.9%. This proposed detector was further successfully applied to the discrimination of different concentrations of CS<sub>2</sub> in air samples and two types of isomers (functional group isomer and carbon-chain isomer).

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