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A DIFFERENTIAL THERMAL LENS SPECTROMETRY METHOD FOR TRACE DETECTION

Thermal lens spectroscopy, reliant on the thermal lens effect, offers a sensitive and non-invasive means for analyzing samples through their light absorption-induced refractive index changes. We aimed to enhance sensitivity using a novel differential method. This involved measuring the signal at the center point of the probe beam spot and comparing it with the signal obtained through spatial filtering, termed the "eclipsed signal." Experimentation utilized Deyman's organic dye "Strawberry2143 v.7"dissolved in alcohol, with a periodically modulated solid-state laser (532 nm) for excitation and a HeNe laser (632.8 nm) for probing. Our approach showcased nearly a 50% enhancement in lowering the detection limit compared to conventional methods. Additionally, we developed a continuous-flow reactor for temperature control, facilitating experiments in photocatalysis and adsorption for water remediation. The described differential thermal lens spectrometry method presents a highly sensitive approach for trace quantification in liquid samples, promising significant analytical advancements.

Keywords

Thermal lens, spectroscopy, sensitivity enhancement, differential method, trace quantification.

Reference

Dobek K. "Thermal Lensing: Outside of the Lasing Medium". Appl. Phys. B. 2022. 128(2): 18–38

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