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Toward 1000-fold Sensitivity Improvement of Capillary Electrophoresis coupled with Laser-Induced Fluorescence Detection for Aminopyrene Trisulfonic Acid Fluorophore

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Summary

Glycan analysis holds significant importance in various fields such as medicine, biotechnology, nanotechnology, bioenergy, and materials science. One widely used method for glycan analysis involves labeling glycans with aminopyrene trisulfonic acid [1] (APTS) and analyzing them using capillary electrophoresis (CE) coupled with laser-induced fluorescence (LIF). However, the sensitivity of CE-LIF faces challenges due to the growing demand for detecting trace amounts of glycans and conducting single-cell or subcellular glycan analysis.

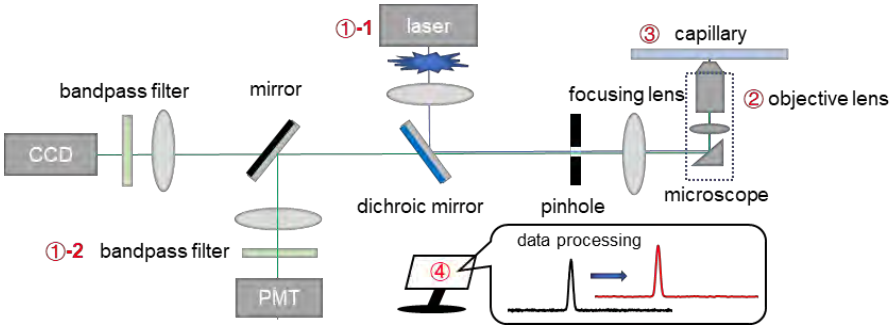

Figure 1. Schematic setup of LIF system.

In our research, we focus on optimizing a LIF system setup to enhance the sensitivity for detecting APTS-labeled glycans (Fig. 1). An inverted microscope (Olympus, IX73) was employed for detection. A 450 nm laser and a 530±55 nm bandpass filter were customized for APTS. The detection window of the capillary was etched to approximately 10 μm thickness. In terms of data processing, we employed 3 times binomial smoothing to reduce background noise fluctuations [2]. The signal-to-noise ratio (SNR) was calculated for sensitivity evaluation [3]. A 1000-fold enhancement in SNR was achieved with our CE-LIF system compared to commercial CE system. We are continuing to work on improving sensitivity and plan to apply our CE-LIF system to glycan analysis.

Acknowledgement

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References

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