

FLUORESCENT AND TRACKING MICROSCOPE SYSTEM

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1. Introduction : A fluorescent microscope is a useful tool to estimate intracellular ionic and/or molecular dynamics. However, most of fluorescent microscopes lack a cell tracking function. Therefore, a freely moving cell easily escapes from a scope and fluorescent observation is often finished.

2. Materials and Methods : To solve this problem, we developed a new fluorescent and tracking microscope system (Fig1. A). By using the developed system, we could observe emission lights to estimate intracellular dynamics, and we could simultaneously observe a transmission light to control an electrical XYZ stage for 3D single cell tracking [1].

3. Experimental Results : To evaluate a performance of the developed system, we demonstrated a continuous recording of intracellular Ca^{2+} concentration in a freely moving *Paramecium multimicronucleatum* over 1.5 minute (Fig1. B). Indo-1 was used as a Ca^{2+} indicator.

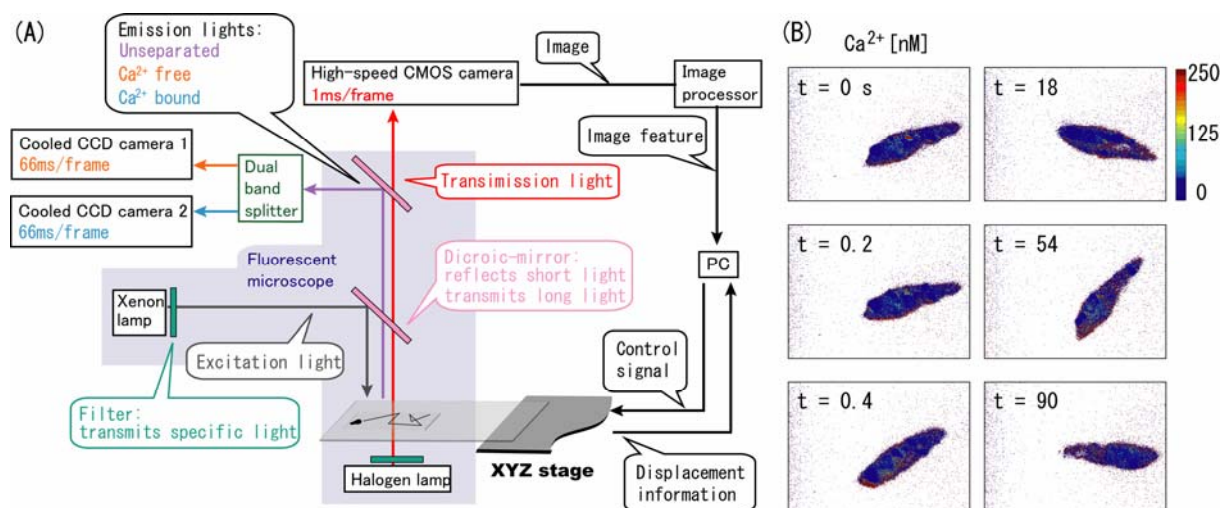


Figure1: (A) Schematic architecture of a fluorescent and tracking microscope system. (B) Time lapse of intracellular Ca^{2+} concentration of a freely moving paramecium.

[1] H. Oku, M. Ishikawa, Theodorus, and K. Hashimoto, "High-speed autofocusing of a cell using diffraction pattern", *Optics Express*, **14**, 3952-3960 (2006)