Doppler-free spectroscopy using continuous-wave optical frequency synthesizer

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A continuous-wave optical frequency synthesizer was developed using a monolithic type continuous-wave optical parametric oscillator (cw-OPO) and an optical frequency comb. The cw-OPO was phase-locked to an optical frequency comb that was phase-locked to an atomic clock. The output frequency of the cw-OPO was frequency-shifted with an electro-optic modulator (EOM), which made it possible to tune the frequency continuously over 10 GHz. Furthermore, Doppler-free spectroscopy was performed using the optical frequency synthesizer for a cesium D1 line at 895 nm.

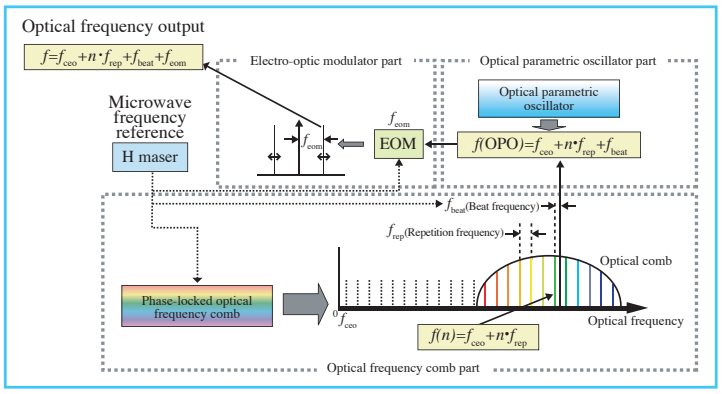

Figure: Schematic diagram of an optical frequency synthesizer. EOM: electronic optical modulator, frep: repetition rate of optical comb, fceo: carrier envelope offset frequency of optical comb, fbeat: beatfrequency between optical comb and optical parametric oscillator, feom: modulation frequency of EOM, n: large integer.

On-demand cell manipulation based on photo-induced cell capturing

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A new photo-responsive cell culture substrate has been developed. The substrate was based on photo-responsive polymer, and cell adhesion to the substrate can be modulated by irradiation of lights with specific wavelengths without affecting cell viability. This substrate enables us to control the adhesion (capturing or removing) of individual adherent cells on our demand by irradiating spot light under a microscope, and is expected to provide an innovative technique to manipulate living and adherent cells.

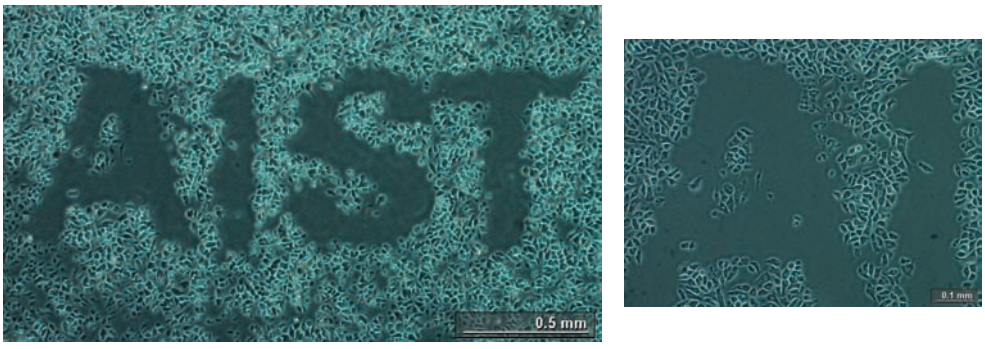

Figure: Living cell patterning based on photo-induced cell capturing.