Measurement of local plasmon resonance of Au nanorods on femtosecond laser polarization using autocorrelation dark-field microscopy

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We established a new measurement technique of plasmon resonance using fringe-resolved e-field autocorrelation with dark-field microscopy. We prepared Au nanorods which have resonance wavelength around 800 nm on a SiO_2 substrate. Ultra-broadband femtosecond laser pulses are employed for excitation. The dark field microscope consists of a dark-field capacitor, object lens and a CCD. Two pulses are incident into the dark-field microscope with variable time delay. Figure 1(a) shows the experimental result of autocorrelation measurement. The autocorrelation function and its amplitude varies by angular polarization of the femtosecond laser pulse. Figure 1(b) shows the corresponding spectra to those in Fig. 1(b) obtained by Fourier transform. We confirmed the resonance enhancement of at ~800 nm for the Au nano-rods. This new measurement scheme enables us to spatiotemporally control nanoplasmon in nanostructures using shaped femtosecond laser pulses and construct new surface reaction platforms.

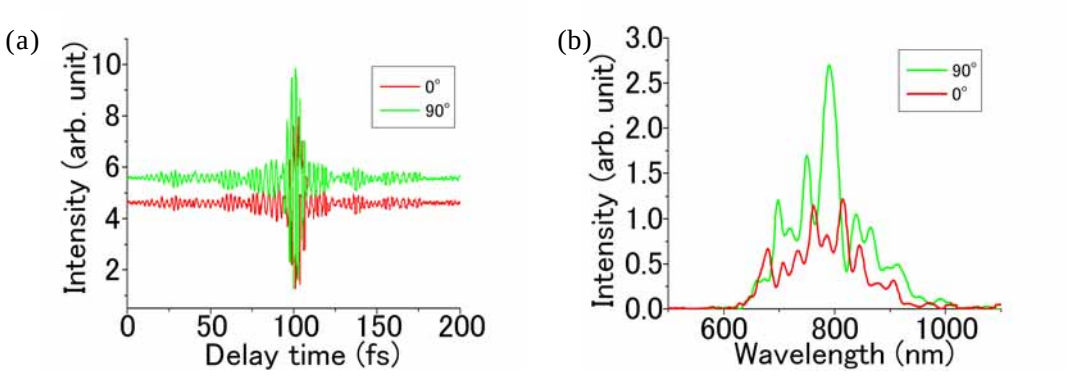

Fig.1 (a) Autocorrelation functions measured for orthogonal polarizations and (b) corresponding spectra.