

# 水を用いた集光フェムト秒ダブルパルス励起 THz 波・X 線同時発生における遅延時間の効果

## Delay Time-dependent THz wave/X-ray Simultaneous Emission from Water Flow under Focused Femtosecond Double Pulse Excitation Conditions

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Our group has been engaging in studies on intense femtosecond (fs) laser interaction with water or aqueous solutions and it has been reported that tightly-focused fs laser irradiation to solutions results in laser ablation [1] associated with X-ray [2], THz wave [3], and sound/ultrasound [4] emission under appropriate experimental conditions. Such simultaneous emission is expected for applications in laboratories [5]. In this presentation, we report THz wave/X-ray simultaneous emission from a thin water flow (10-15  $\mu\text{m}$ ) under double-pulsed fs laser pulse (35 fs, the main pulse; p-pol./0.4mJ, the pre-pulse; s-pol./0.1mJ) irradiation conditions with the time delay up to 15 ns. Figure 1 shows normalized  $E$  field intensities calculated from signals measured in conventional time-domain spectroscopy observed in the reflection side. These dynamic changes in THz emission spectra can be assigned to laser ablation phenomena induced on the water flow by the pre-pulse irradiation such as transient surface roughness formation and droplet ejection. For instance, at 14.7 ns, the distorted spectrum may reflect water absorption since THz emission passes through water mist ejected from the flow surface.

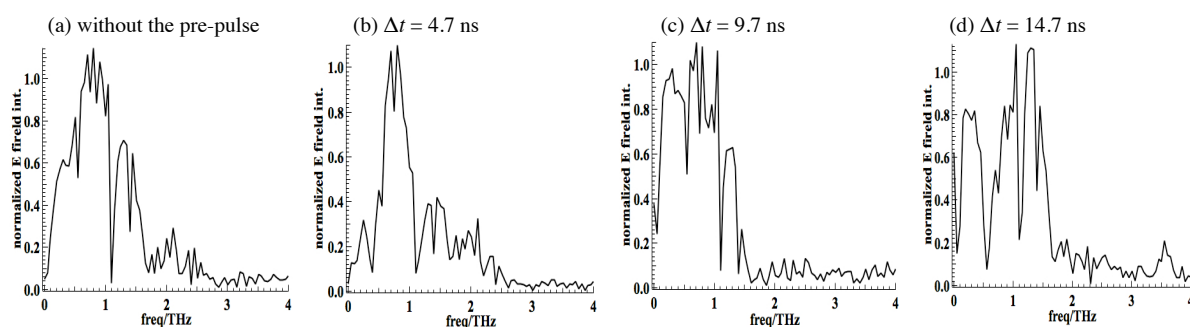


Figure 1 Normalized  $E$  field intensities (a) only with the main pulse 0.4 mJ/pulse, p-pol.) without the pre-pulse, with the pre-pulse (0.05 mJ/pulse, s-pol.) at the delay (b) 4.7 ns, (c) 9.7 ns, and (d) 14.7 ns.

### References

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