

Recent progress of material science with intense short pulse lasers

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Abstract

Materials interacted with intense short pulse lasers can generate radiations such as electro magnetic waves (THz waves , x-rays, lights), and electrons, which are high potential as the quantum beam sources to investigate surface structuring on materials in material science. As a pump source, an intense THz waves is used for in-situ measurement of periodic surface structures with high-spatiotemporal resolution. The periodicity of the periodic structures can be as small as $\lambda/25$ for the wavelength of THz waves [1]. We have also studied intense THz waves generation from argon cluster plasmas interacted with intense short pulse lasers[2] [3].

As a probe for surface structuring on materials, electrons have relatively large cross section of elastic scattering for atoms. We have developed a short pulsed electron beam with laser accelerated electron pulses to demonstrate an ultrafast electron diffraction (UED) [4][5]. The estimated pulse duration of electron was 89fs. The short pulsed electron beam might be applied not only for UED but also for detecting the surface waves induced in the laser plasma. We have planed to detect the surface waves induced by THz waves with using ultrafast electron beam.

References

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