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Frequency upshift of terahertz radiation via flash ionization scheme NOBORU YUGAMI, TAKESHI HIGASHIGUCHI, FUMINORI SUZUKI, MASAHIRO NAKATA, TAKAMITSU OTSUKA, Utsunomiya University — When plasmas are instantaneously created around an electromagnetic wave, frequency of the wave up-converted to the frequency, which depends on the plasma frequency. This phenomenon is called as the flash-ionization. The theory requires the plasma creation in time much shorter than an oscillation period of the electromagnetic wave. We have demonstrated the proof of principle experiment using the interaction between a terahertz wave and plasmas created by an ultrashort laser pulse, which ensures the plasma creation time-scale much shorter than a period of electromagnetic source wave. We observed frequency up-conversion from 0.2 THz to 0.7–1.5 THz by the irradiance of the laser in ZnSe crystal. The up-conversion to the broad frequencies suggests that the flash ionization occurs in non-uniform plasmas produced in the deeper region of the crystal. The results support the potentiality of developing tunable and short pulse coherent radiation sources with a frequency THz spectral region.

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