Electro-optically tunable compact terahertz source

DONG WU, Naval Research Laboratory — The promise of terahertz technology for surveillance and reconnaissance applications is huge. Despite the technical advantages, the major challenge today in terahertz technology is the development of a portable high-power terahertz source. Of the several available terahertz source technologies those based on the difference frequency technique are very promising, as they can produce a relatively high power terahertz beam over the frequency from 100 GHz to 3.5 THz, which is tunable. However, earlier this technique suffered from a high loss of terahertz signal, and produced a weak terahertz beam, in part due to a large impedance mismatching. Also its frequency tuning was cumbersome and its tuning range was limited since it was typically performed by rotating a nonlinear optical crystal against the pumping beam. In our recent experiments we modified the technique to improve the impedance matching and to replace the mechanical tuning with an electro-optical tuning. With this new technique we demonstrated a terahertz beam output power exceeding 10 mW (occasionally ~ 100 mW) at frequencies around 1 THz. Our new technique the frequency tuning is very convenient and not limited by the geometry of the experimental set up. Detailed experiments and experimental results will be discussed.

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Date submitted: 29 Nov 2005

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