THZ SYSTEM PACKAGING FACILITATED BY TAILORED METAL-COATED 3D-PRINTED FREEFORM STRUCTURES

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3D printing of freeform millimeter-wave (mmW) interconnects presents a promising approach for THz packaging solutions operating above 100 GHz, offering unmatched design flexibility and high precision.

Previous studies have demonstrated the use of multi-photon laser lithography (MPL), a high-resolution direct-write fabrication method, to create metal-coated freeform structures (MCFS) for connecting coplanar waveguides (CPWs) on separate PCBs, achieving operational bandwidths of up to 300 GHz.

In this work, we applied MCFS in THz system packaging for the first time and successfully integrated a traveling wave amplifier (TWA) microchip. Electromagnetic simulations confirm the high performance of this approach, demonstrating excellent impedance matching across the D- and H-bands and low insertion with 3 dB-bandwidths exceeding 0.3 THz.

These results highlight the potential of 3D-printed interconnects as a transformative solution for THz system integration and advanced packaging.