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# Terahertz System Integration Platforms: Metallic vs. Dielectric

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Recently, there has been increasing interest in the application of terahertz (THz) waves for communications and sensing with the advance of enabling technologies for signal generation and detection, where both electronic and photonic devices are currently available [1]. One of the critical and practical issues that we face in the THz regions is a loss of RF interconnections as frequencies increase. Hollow waveguides have been conventionally employed to accommodate high-frequency devices and circuits [2]. However, RF loss is not negligibly small at frequencies above 500 GHz due to metallic loss of waveguides, and also the assembly of semiconductor devices on such waveguides becomes extremely difficult due to reduction in the size of waveguides below several hundreds of microns. Low-cost and reproducible integration/packaging technologies are urgently required to expand applications of THz systems.

In this paper, we discuss the issue of loss in interconnections in THz integrated circuits, and compare two promising solutions; MEMS-based metallic-waveguide platforms [3, 4] and dielectric-waveguide platforms [5, 6]. Figure 1 shows a schematic concept of future THz integrated systems, based on the two platforms to support the integration of functional devices. In addition, we also discuss two options, optical cables and dielectric RF cables, for inter-module connections between transmitter/receiver main frames and antenna frontends.

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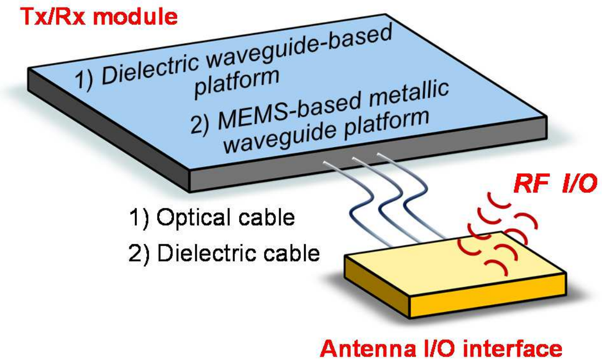

**Figure 1.** Concept of THz integrated electronic and photonic systems.

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