

A high - Gain Low Profile THz Gaussian Beam Antenna

 Communications & Information

 Manufacturing

Digital Broadcasting, Telecommunication and Optoelectronics

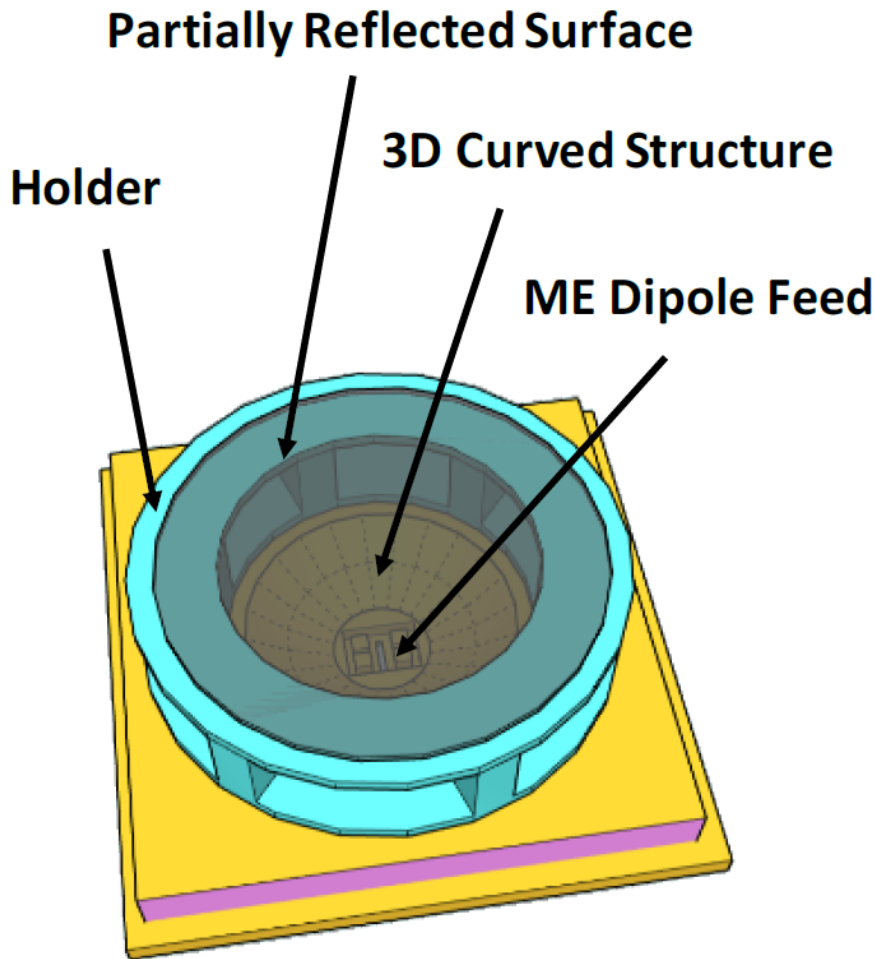


Figure 1. Schematic diagram of THz GBA.

Opportunity

Future 6G communication will require Terahertz (THz) technology because of the high terabits/sec (Tb/s) data rate. But due to low power and high propagating loss of THz source, transmission distance of THz electromagnetic wave is limited. Current design of high gain and low profile THz antenna is constrained by conventional manufacturing technologies such as metal milling, electroplating and stacked printed circuit boards because these methods are not conducive to fabricate THz antenna at microscale. The invention presented here will alleviate this problem. An imprinted technology in silicon to fabricate is proposed to fabricate the high

Remarks

48th International Exhibition of Inventions Geneva (IEIG) (2023) - Gold Medal

IP Status

Patent granted



Technology Readiness Level (TRL) ?

3

Inventor(s)

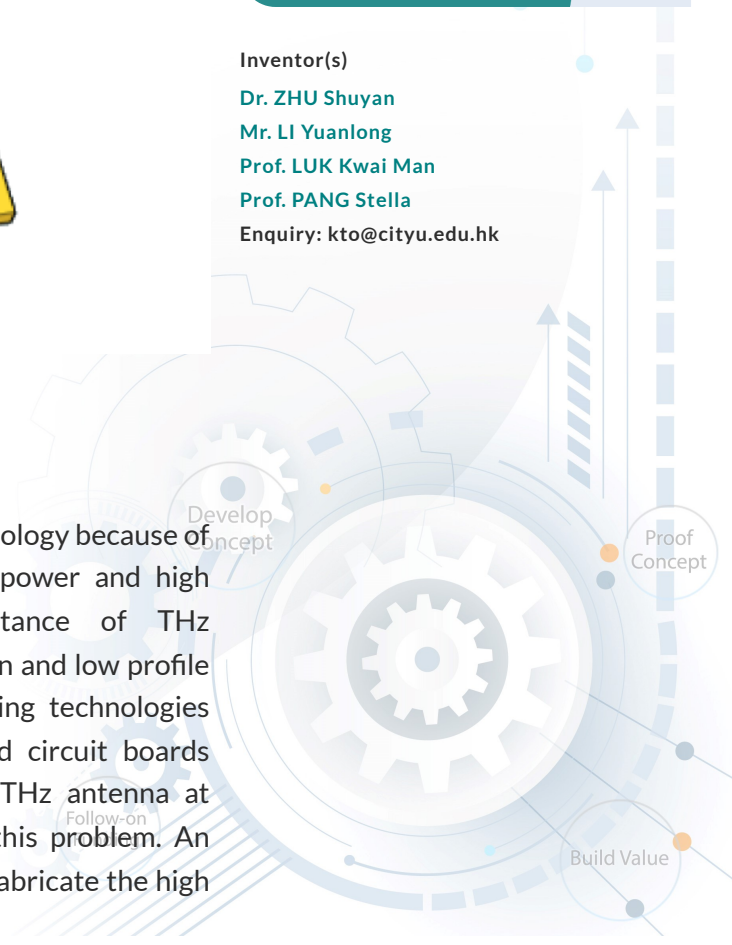
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gain and low profile THz gaussian beam antenna(GBA). The THz GBA fabricated with the proposed technologies are fast, highly accurate and low cost. It also allows the THz GBA to maintain a highly directive radiation.

Technology

This invention uses imprint technology in silicon(Si) for fabricating the high gain and low profile THz gaussian beam antenna(GBA). This THz GBA utilizes metalized Si magneto-electric (ME) dipole as antenna feed, metalized spherical concave cavity structure and partially reflective surface (PRS) as open resonator cavity. With this , a high gain of 20.3 dBi was achieved for the THz GBA at 1.04THz. Also, the surface roughness od the THz GBA was as low as a few nanometers.

Advantages

- This invention is a first THz GBA with high gain of 20.3 dBi at 1.04 THz
- Low profile (smaller than three wavelengths) for easier integration as compact device
- Fast, accurate and low-cost fabrication with the developed imprint technology.
- Compatible with Si-based microfabrication process
- Applicable for GBA with 10 to 100 THz

Applications

- Potential candidate for the future 6G THz communication, especially in short-distance high-data rate communication
- Can be used to transmit and receive radio waves at 1THz in compact communication systems at a longer communication distance

