Back Metal and Through Substrate Via in Flexible Thin-Film Technology

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Abstract

This work presents the design, implementation, and characterisation of a novel Graphene technology in a flexible thin-film substrate for the first time. The structure is realised by 200 nm-thick highly conductive back metal, sandwiched between 3.8 µm-thick polyimide layers. Reliability and repeatability of back metal and through substrate via technology are confirmed over an ultrawide frequency band. Measurement results of the initial test structures show good low impedance data from 0.5 GHz to 70 GHz, and the preservation of the flexibility of the entire structure is proved by mechanical bending. The presented novel technology enables the development of highly sensitive biomedical products and flexible Graphene-based RF electronics with stable ground in a monolithically integrated configuration. The technology is additionally suitable for the high frequency properties of graphene-based diodes and devices, as it works up to 70 GHz and uses thin substrate.

Figures

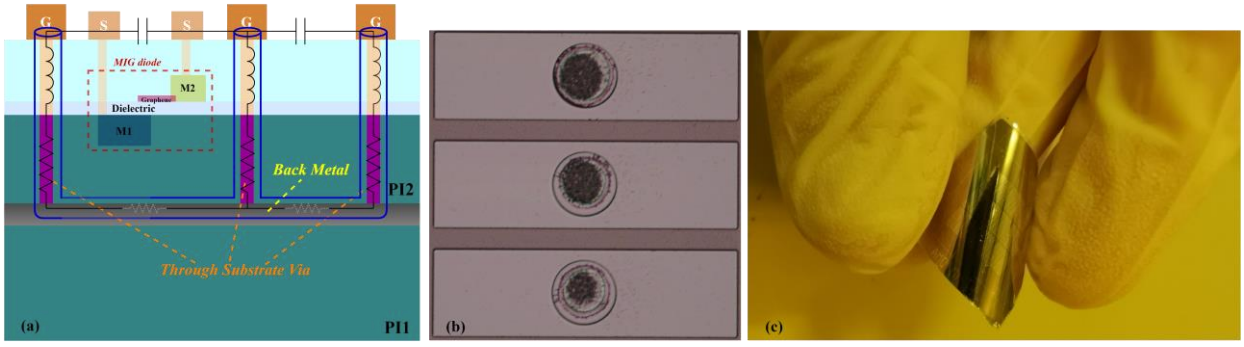

Figure 1: (a) Cross-section of back metal with through substrate via technology including via model (not to scale), (b) chip micrograph of test structures and (c) optical image showing the flexibility

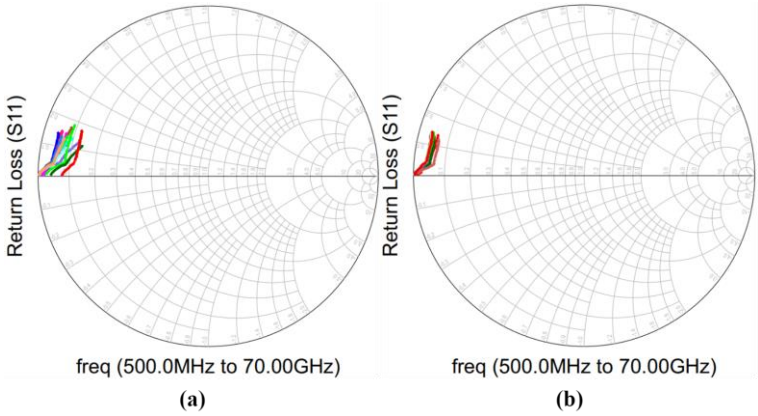

Figure 2: High frequency measurement results of the initial test structures for back side conductivity: (a) chip 1 and (b) chip 2