High-Efficiency Microwave Graphene Antenna

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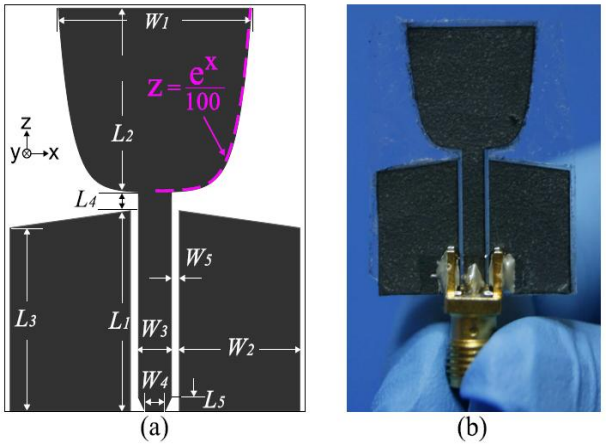
A method for scalable preparation of robust and highly conductive graphene multilayer films for design an ultra-wideband (UWB) antenna has been demonstrated. It is shown to have a very high efficiency of nearly 80%, averaged from 3.1 to 10.6 GHz one of the highest reported value to date for graphene antennas in the microwave region. These performances are due to the high quality graphene films as well as the efficiency-driven antenna design strategy and accurate fabrication technology. The experimental data confirmed that the fabricated graphene films with the thickness of 100 µm, made from binder-free and surfactant-free graphene inks, have a high electrical conductivity of 3.3 × 104 S/m that makes these films are very promising as efficient, environmentally friendly and economically viable non-metallic conductors for microwave devices.

References

[1] K. Novoselov, et al, Nature (2012) 490,
[2] T. T. Tung et al J. Mater Chem C, (2016) 10620
[3] X. Huang et al. Appl. Phys. Lett.,(2015) 203105.

Figures

Figure 1: (a) Graphene antenna configuration and (b) a prototype realization



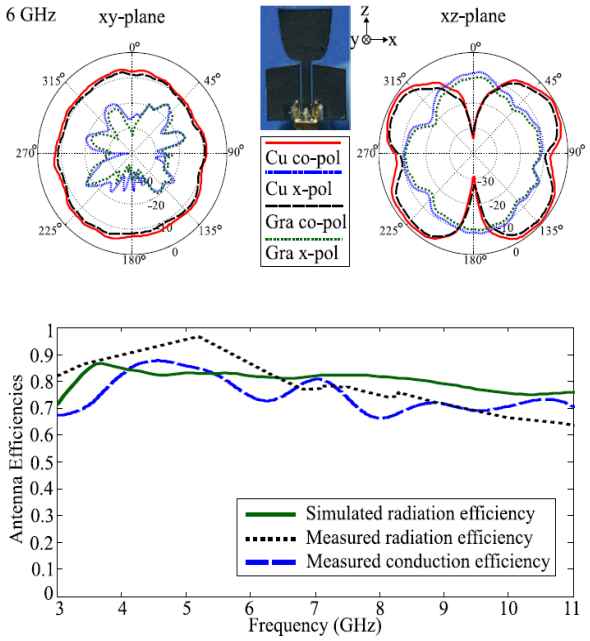


Figure 2: Measured co- and cross-polarized radiation patterns for the graphene and reference copper (Cu) antennas in the xy- and xz-planes at 6 GHz normalized to the maximum gain of the copper antenna(the top) and Simulated and measured radiation efficiencies and measured conduction efficiency of the proposed antenna (the bottom)