Sub-6GHz non-commercial Antenna Design Using Graphene-Based Conductive Films

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Abstract

Graphene is a two-dimensional material with atomic-scale thickness, in which the atoms are arranged periodically in a hexagonal lattice. It has been tremendously focused on radio frequency and microwave applications, owing to its unique electronic, optical, and mechanical properties [1]. Furthermore, graphene is well-known for its remarkable mechanical flexibility, chemical stability, electrical and thermal conductivity, which makes its use in novel miniature antennas in various applications [2][3]. Current work focuses on the fabrication of graphene-based antennas for non-commercial Sub-6 GHz wireless communication. The antenna and patch dimensions are optimized using High Frequency Structure Simulator (HFSS) software to achieve the desired frequency. The fabricated graphene antenna will cover a non-commercial frequency band of 5.75 GHz with ~30dB of return loss (S_{11}). The graphene-based antenna ensures operation in dynamic settings by providing durability and lower weight than traditional metal-based antennas.

References

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[2] Guanxuan Lu, Jiaqi Wang, Zhemiao Xie, John T. W. Yeow. IEEE Open Journal of Nanotechnology, 3 (2021) 15 – 23.
[3] Wang, Xinhai, Liqiong Wu, Hua Chen, Wei Wang, and Zhaoping Liu. Electronics, 12 (2023) 2307.

Figure

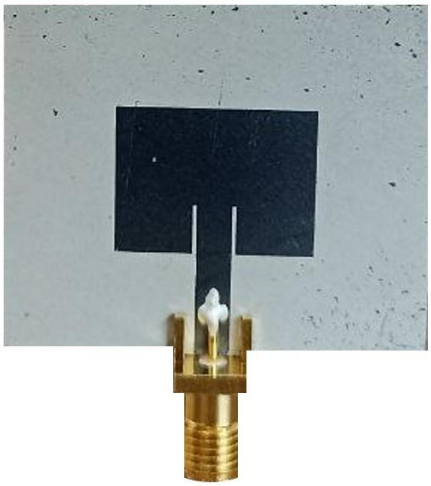

Figure 1: Graphene-based antenna for sub-6GHz applications