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High gain graphene-based magneto-electric antenna for 5G communications

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Abstract:

This paper introduces a wideband graphene-based magneto-electric (ME) antenna with reconfigurable radiation characteristics for 5G communications. It consists of graphene patches deposited on silicon oxide substrate arranged horizontally and vertically to act as a ME-antenna. The reconfigurable conductivity of graphene is used to control the operating bandwidth of the antenna. The single element has an impedance matching bandwidth of 78.3 % with circular polarized band of 61.2% for applying chemical potential, μc=2 eV. The effect of changing the graphene reconfigurable conductivity on the radiation characteristics of the ME-antenna is investigated. The operating bandwidth is controlled by proper biasing the graphene sheet. The peak gain and the antenna efficiency are increased with increasing the chemical potential value due to the increase in graphene conductivity. The mutual coupling between ME-antenna elements is investigated for linear and circular arrangements. Octagonal array consists of 8-similar elements are constructed to produce electronic beam switching in different directions. Single beam, dual-beams, and omni-directional beam are achieved by controlling the graphene conductivity of single, two, and all the ME-elements in the array. © 2018 IEEE.

Reference:

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