ELECTRICALLY-CONTROLLED NEAR-FIELD RADIATIVE THERMAL MODULATOR

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ABSTRACT. In this work, we propose a near-field radiative thermal modulator made of two graphene-covered silicon carbide (SiC) plates separated by a nanometer vacuum gap. The near-field photon tunneling between the emitter and receiver is modulated by changing graphene chemical potential with symmetrically or asymmetrically applied voltage biases. The radiative heat flux calculated from fluctuational electrodynamics significantly varies with graphene chemical potentials due to tunable near-field coupling strength between graphene plasmon across the vacuum gap. Thermal modulation and switching, which are the key functionalities required for a thermal modulator, are theoretically realized and analyzed.