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Observation of Gate-Tunable Coherent Perfect Absorption of Terahertz Waves in Graphene¹ COSKUN KOCABAS, NURBEK KAKENOV, OSMAN BALCI, Bilkent University, TAYLAN TAKAN, VEDAT ALI OZKAN, HAKAN ALTAN, Middle East Technical University — We report experimental observation of electrically tunable coherent perfect absorption (CPA) of terahertz (THz) radiation in graphene. We develop a reflection-type tunable THz cavity formed by a large-area graphene layer, a metallic reflective electrode, and an electrolytic medium in between. Ionic gating in the THz cavity allows us to tune the Fermi energy of graphene up to 1 eV and to achieve a critical coupling condition at 2.8 THz with absorption of 100 %. With the enhanced THz absorption, we were able to measure the Fermi energy dependence of the transport scattering time of highly doped graphene. Furthermore, we demonstrate flexible active THz surfaces that yield large modulation in the THz reflectivity with low insertion losses. We anticipate that the gate-tunable CPA will lead to efficient active THz optoelectronics applications.

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