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Strong Plasmon Reflection at Nanometer-Size Gaps in Monolayer Graphene on SiC ALEXEY B. KUZMENKO, University of Geneva, Switzerland, JIAINING CHEN, CIC nanoGUNE, San Sebastian, Spain, MAXIM L. NESTEROV, University of Zaragoza, Spain, ALEXEY YU. NIKITIN, CIC nanoGUNE, San Sebastian, Spain, SUKOSIN THONGRATTANASIRI, ICREA, Barcelona, Spain, PABLO ALONSO-GONZALEZ, CIC nanoGUNE, San Sebastian, Spain, TETIANA M. SLIPCHENKO, University of Zaragoza, Spain, FLORIAN SPECK, University of Erlangen-Nurnberg, Germany, MARKUS OSTLER, THOMAS SEYLLER, TU Chemnitz, Germany, IRIS CRASSEE, University of Geneva, Switzerland, FRANK H.L. KOPPENS, ICFO, Castelldefels, Spain, LUIS MARTIN-MORENO, University of Zaragoza, Spain, F. JAVIER GARCIA DE ABAJO, ICREA, Barcelona, Spain, RAINER HILLENBRAND, CIC nanoGUNE, San Sebastian, Spain — Tip-enhanced infrared near-field microscopy is used to study propagating plasmons in epitaxial quasi-free-standing monolayer graphene on silicon carbide. We observe that plasmons are strongly reflected at graphene gaps at the steps between the substrate terraces. For the step height of only 1.5 nm, which is two orders of magnitude smaller than the plasmon wavelength, the reflection signal reaches 20 percent of its value at graphene edges, and it approaches 0.5 for steps of 5 nm. We support this observation with extensive numerical simulations and give physical rationale for this intriguing phenomenon. Our work suggests that plasmon propagation in graphene-based circuits can be controlled using ultracompact nanostructures. J. Chen et al., Nano Lett., DOI: 10.1021/nl403622t (2013).

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