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Tunable Absorption Enhancement with Graphene Nanodisk Arrays YUMIN WANG, Rice University, Houston, Texas 77005, US, ZHEYU FANG, Peking University, Beijing 100871, China, ANDREA SCHLATHER, Rice University, Houston, Texas 77005, US, ZHENG LIU, Nanyang Technological University, 50 Nanyang Ave., Singapore 639798, PULICKEL AJAYAN, Rice University, Houston, Texas 77005, US, JAVIER GARCIA DE ABAJO, Institut de Ciencies Fotoniques, 08860 Castelldefels, Barcelona, Spain, PETER NORDLANDER, Rice University, Houston, Texas 77005, US, XING ZHU, Peking University, Beijing 100871, China, NAOMI HALAS, Rice University, Houston, Texas 77005, US — Extended single-layer graphene has weak optical absorption at visible and infrared wavelengths, which severely reduces its potential for optoelectronic applications. Here, by tailoring a graphene layer into an array of closely packed graphene nanodisks, we improve its absorption efficiency from less than 3% to 30% in the infrared region of the spectrum. In addition, we demonstrate that this enhanced absorption depends on nanodisk size, interparticle spacing and voltage-driven electrostatic doping.[1] These finding suggests that graphene nanomaterials are promising media for infrared electro-optic devices.

[1] Z.Y. Fang et al., Nano Lett. 14(2014)10.1021/nl404042h

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