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Biosensing with Spatial Resolution Using Graphene LAUREN ZUNDEL, ALEJANDRO MANJAVACAS, The University of New Mexico — Surface plasmons, the collective oscillation of conduction electrons, are a powerful sensing tool due to the extraordinary light confinement they provide. Graphene nanostructures, which have been shown to support strong plasmon resonances in the infrared part of the spectrum, have a strong potential to be used as platforms to develop versatile biosensors, due to the unique ability to tune their resonances by means of electrical doping. Here, we take advantage of these properties to propose an optical sensor with spatial resolution below the diffraction limit. To this end, we design a device consisting of an array of identical nanodisks divided into a number of subarrays, or pixels, each with a uniform doping level. Therefore, by individually adjusting the doping level of each of these pixels, it is possible to bring them sequentially into resonance with the spectrum of the analyte, thus enabling the detection of both its presence and location. The results of this investigation help to set the foundations to develop novel label-free infrared sensors, which can open doors for new applications to sense the chemical composition of complex biological structures with temporal and spatial resolution.

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