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Plasmon-Enhanced Photocurrent in a Graphene Nanoconstriction
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P.L. MCEUEN, D.C. RALPH, Cornell University — A plasmonic nanostructure
can act like an optical antenna, concentrating light into a deep sub-wavelength vol-
ume and enabling manipulation of light-electron interactions at the nanometer scale.
Achieving efficient coupling from such antennas to functional electrical devices has
been challenging, because the region of field enhancement is so small. We report the
use of a use a self- aligned fabrication process to couple a gold break junction act-
ing as a plasmonic antenna with a sub-10-nm graphene constriction. The nonlinear
electrical characteristics of the graphene device allow it to serve as a photodetector.
We observe a photocurrent that is peaked at the plasmon frequency and strongly
modulated by the polarization direction of the incident light. The enhancement of
the local optical-frequency electric field induced by the plasmon is a factor of 1.5-10.

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