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Graphene-based platform for nano-scale infrared near-field spectroscopy of biological materials OMAR KHATIB, University of California at San Diego, JOSHUA D. WOOD, GREGORY P. DOIDGE, GREGORY L. DAMHORST, ANIRUDDH RANGARAJAN, RASHID BASHIR, University of Illinois at Urbana-Champaign, ERIC POP, Stanford University, JOSEPH W. LYDING, University of Illinois at Urbana-Champaign, DIMITRI N. BASOV, University of California at San Diego — In biological and life sciences, Fourier Transform Infrared (FTIR) spectroscopy serves as a noninvasive probe of vibrational fingerprints used to identify chemical and molecular species. Near-field spectroscopy, based on the illumination of an atomic force microscope (AFM) tip with an infrared laser, allows for determination of IR properties of a material at nanometer length scales. However, application of near-field IR spectroscopy to most biological systems has thus far been elusive. Physiological conditions required for experimentation are incompatible with typical implementations of nano-FTIR. Recently it became possible to trap water and small biomolecules underneath large-area graphene sheets grown by chemical vapor deposition (CVD). The graphene layer serves as an IR-transparent cover that allows for a near-field interrogation of the underlying layers. We discuss the applicability of near-field IR nano-imaging and spectroscopy to trapped biomolecules in aqueous environments.

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