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Optical Detection of Local Electric Field Dynamics in Solutions by Waveguide-integrated Graphene Device JASON HORNG, HALLEH BALCH, UC Berkeley, FENG WANG TEAM — The spatio-temporal dynamics of local electric fields in ionic solutions plays a central role in various chemical and biological processes ranging from batteries technologies to neuron signaling. A non-invasive, precise detection scheme for measuring local electric fields dynamics has long been sought for. Here, we report a sensitive, high-speed, high spatial resolution optical imaging method for local electric fields based on the unique optoelectronic properties of graphene. With enhancement from a waveguide involving critical coupling concept, we show that our graphene optical sensor provides an ideal platform for studying dynamics of local electric field fluctuations in different nonequilibrium solutions.

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