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**An infrared probe of tunable dielectrics in metal-oxide-semiconductor structures** KEVIN MIKOLAITIS, ZHIQIANG LI, University of California, San Diego, GUANGMING WANG, ALAN HEEGER, University of California, Santa Barbara, DIMITRI BASOV, University of California, San Diego, UNIVERSITY OF CALIFORNIA, SAN DIEGO COLLABORATION, UNIVERSITY OF CALIFORNIA, SANTA BARBARA COLLABORATION — We present a novel approach to investigate electric-field- induced changes of the dielectric function of the gate insulator in metal-oxide- semiconductor (MOS) structures using infrared spectroscopy. This approach is enabled by an innovative design of the electrodes. We investigated structures based on $TiO_2$ dielectric insulator on doped silicon commonly used in (organic) FET devices. We show that the voltage-induced changes of dielectric constant of $TiO_2$ originate from a radical modification of lattice vibration modes of this compound induced by applied electric field. Novel characterization capabilities demonstrated in our work uncover the unique potential of infrared spectroscopy for the analysis of tunable insulators and also for the examination of charge injection phenomena in semiconductors.

Zhiqiang Li
University of California, San Diego

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