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Optical detection of adsorbed CO_2 and other gases on ferroelectric surfaces using second harmonic generation (SHG) GUERAU CABRERA, DISHENG CHEN, West Virginia University, KARTHIK JAMBUNATHAN, RUIJUAN XU, University of Illinois, ALEJANDRO CABRERA, P. Universidad Catolica de Chile, LANE MARTIN, University of Illinois, MIKEL HOLCOMB, West Virginia University — Due to their polar surfaces, ferroelectrics may provide an ideal way to detect and collect gas molecules, useful for applications such as gas sensing and pollution mitigation. Since ferroelectric materials have a high reliability (at least 10^9 switching cycles) these sensors could be used for prolonged periods of time without failure. Second harmonic generation (SHG) allows us to determine the spatial orientation of surface adsorbates and to monitor in realtime the kinetics of adsorption/desorption. In preliminary experiments we see a variation of SHG signal from the surface of $PbZrTiO_3$ (PZT) (100 nm film 20% Zr, 80% Ti) when dosed with 1 atm of N_2 or CO_2. There is a 21% increase in signal when dosed with N_2 with respect to signal in vacuum and there is a 19.9% increase in signal when dosed with CO_2 with respect to signal in vacuum. Further studies will be performed to determine the orientation of these molecules on the surface of this device. Experiments will also be performed while polarizing the device with an external electric field to determine the effect of polarization on adsorption/desorption of molecules.

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