

Abstract Submitted
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Imaging Biological Systems using Dielectric Near-Field Microscopy KEITH BROWN, DAVID ISSADORE, TOM HUNT, ROBERT WESTERVELT, Harvard University, WESTERVELT GROUP TEAM — We have developed a dielectric spectrometer for use on biological systems. The spectrum of dielectric response to RF electric fields is analogous to color as an optical response. Measurement of the dielectric spectrum from ~ 10 kHz to ~ 3 GHz will reveal information about the structure and conditions of protein solutions, protein crystals and biological tissues. We designed and built a system to test biological samples in a microfluidic chamber mounted on a circuit board. The apparatus measures the RF dielectric spectrum directly, or by analyzing the pulse response in the time domain. We have constructed several versions of the hardware for sensitive capacitive measurements, including two types of capacitive bridges, and a transmission line, incorporating precision electronics and local generation of pulses. A goal is to scale the system down and implement many dielectric spectrometers as an array of pixels on a CMOS chip for dielectric near-field microscopy of biological samples. This work made possible by NSEC NSF grant PHY-0117795 and the NCI MIT-Harvard CCNE.

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