Abstract Submitted
for the MAR05 Meeting of
The American Physical Society

Dielectric Properties of Live Yeast Cells Expressed with the Motor Protein Prestin JOHN MILLER, DHARMAKEERTHI NAWARATHNA, DAVID WARMFLASH, University of Houston, FRED PEREIRA, WILLIAM BROWNELL, Baylor College of Medicine — We report on the linear and nonlinear dielectric properties of budding yeast (S. cerevisiae) cells, one strain of which has been genetically modified to express prestin. This motor protein plays a crucial role in the large electromotility exhibited by the outer hair cells (OHCs) of mammalian inner ears. Live cell suspensions exhibit enormous dielectric responses, which can be used to probe metabolic activity, membrane potential, and other properties. We observe a broad peak, centered around 20 kHz, in the normalized difference in dielectric responses between the two strains, and also observe substantial differences in nonlinear harmonic responses. Our data appears to correlate with measurements showing piezoelectric resonances in OHCs. These results suggest that dielectric probes can be used to study the electrical properties of prestin and other proteins, either expressed in live cells or (from our other recent studies on tubulin) as pure protein suspensions.

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Date submitted: 04 Dec 2004 Electronic form version 1.4