

ELECTROMOTILITY OF HEK CELLS MEASURED WITH AFM.

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Membrane displacements from voltage clamp pulses were measured using AFM. In 184 mM saline, depolarization moved the membrane outward while hyperpolarization moved it inwards ($\sim 0.04 \text{ \AA/mV}$). At bath concentrations below 12 mM, the direction of displacement reversed, and reached -0.16 \AA/mV in isotonic sucrose. These findings can be explained by modeling the bilayer interfaces as Helmholtz capacitors where the surface tension on either side of the membrane is a function of the surface charge density and the applied voltage. The area expansion modulus was estimated at $\sim 0.2 \text{ N/m}$, with surface potentials of -4 mV (external) and -15 mV (internal) under normal ionic conditions.

