

Abstract Submitted  
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**Ultrasensitive Force Controlled Live Cell Optical Imaging and Voltage Sensing** AARON LEWIS, Retired, AARON BRAHAMI, University of Jerusalem, Dept Of Applied Physics, Jerusalem, Israel, HADAS LEVY, Hebrew University of Jerusalem, Dept Of Applied Physics, Jerusalem, Israel, EFRAT ZLOTKIN-RIVKIN, Hebrew University of Jerusalem, Dept of Cell Developemnt Biology, Jerusalem, Israel, DIMITRY LEV, TALIA YESHUA, OLEG FEDOSYEV, Hebrew University of Jerusalem, Dept Of Applied Physics, Jerusalem, Israel, BEN-JAMIN AROETI, Hebrew University of Jerusalem, Dept of Cell Developemnt Biology, Jerusalem, Israel — Force controlled optical and scanned probe imaging of voltage sensing of living cell membranes is demonstrated by overcoming limitations inherent in atomic force microscopy (AFM) since its inception in 1986.....<sup>1</sup>. This work and the advances that have allowed it permit a whole genre of functional biological imaging with stiff scanned probe imaging cantilevers having force constants ranging from 1-10N/m. To achieve these innovations, several constraints had to be overcome that have restricted live cell AFM imaging to only highly limiting ultrasoft (0.05N/m) cantilevers. The limitations extend even to structural topographic imaging with these soft cantilevers having inherent geometric and other shortcomings. This is exemplified by difficulties in imaging fine cell protrusions, such as microvilli that can emanate from cell membranes. The progress reported here demonstrates both ultimate topographic imaging and new functional applications that should have a significant impact on biological imaging of living and other ultrasoft systems.

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