Abstract Submitted
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Ultrathin single crystal diamond nanomechanical resonators[1] M.P. RAY, J.W. BALDWIN, J.E. BUTLER, B.B. PATE, Naval Research Laboratory, T. FEYGELSON, SAIC Inc., M. ZALALUTDINOV, Global Strategies Group Inc. — We report the fabrication and operation of ultrathin (< 100 nm) high-frequency single crystal diamond nanomechanical resonators. Suspended diamond dome structures were created in a microwave hydrogen plasma which undercuts a sacrificial damage layer formed by medium energy (150-180 keV) ion implantation at a high fluence ($>1\times10^{16}$ ions/cm^2). Under high vacuum conditions we measure resonant frequencies between 70 MHz and 550 MHz with quality factors ranging from ~ 750 to over 1000 using an optical technique. Mechanical, thermal and optical properties in combination with chemical inertness and bio-compatibility of single crystal diamond make these high-frequency, low-mass dome resonators suitable for sensing applications.

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