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Low temperature internal friction peak in Boron doped nanocrystalline diamond THOMAS METCALF, BRIAN HOUSTON, JAMES BUTLER, Naval Research Laboratory, TATYANA FEYGELSON, GeoCenters, Inc. — Recent measurements of the low-temperature internal friction (Q^{-1}) of nanocrystalline diamond films have revealed that these films have a broad but distinct internal friction peak at approximately 2K. In contrast to the off-peak baseline low-temperature Q^{-1} of these films, which show no measureable variation over a factor of 4 span in amplitude, the Q^{-1} at the peak decreases by as much as 60% when the measurement amplitude is increased by a factor of 4. The similarity of this peak with a low-temperature peak previously observed in boron-doped silicon led to the possibility that the peak is the result of boron contamination of the diamond films. To further investigate this, diamond films with varying degrees boron doping were grown and measured between room temperature and 400 mK. The films are typically 0.5 μm thick and are grown on silicon double paddle oscillator substrates, which have an extremely low internal friction background and enable highly sensitive measurements of the mechanical properties of thin films. Preliminary results show an upwards shift in temperature of the peak with increasing boron levels.

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