Abstract Submitted
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Hexagonal boron nitride particles for determining the thermal conductivity of diamond films based on near-ultraviolet micro-Raman mapping[1] BRIAN SQUIRES, B LOGAN HANCOCK, MOHAMMAD NAZARI, JONATHAN ANDERSON, EDWIN PINER, MARK HOLTZ, Texas State Univ-San Marcos — Studies are reported of the thermal conductivity (κ) for a suspended ˜1 m thick diamond membrane. Near-ultraviolet micro-Raman spectroscopy is used to map the temperature rise produced in the diamond by a micro-fabricated heater and in hexagonal boron nitride micro/ nano-particles which are dispersed on the surface as local temperature sensors independent of thermal stress in the diamond. Thermal conductivity is determined analytically from Raman temperature rise and also by fitting data via simulation, using a Monte Carlo optimization approach. The low value obtained for κ, $78.4^{+8.6}_{-5.1}$ W m^{-1} K^{-1}, is attributed to the nanocrystalline diamond grain structure as analyzed by transmission electron microscopy (TEM). TEM identifies a disordered silicon-carbon interfacial layer ˜2 nm thick which is expected to affect the diamond/silicon thermal boundary resistance.

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