Casimir Forces from Conductive Silicon Carbide Surfaces

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Nowadays fluctuation induced electromagnetic (EM) forces between neutral bodies attract more and more interest in device physics toward technology applications [1]. These forces arise due to perturbation of quantum fluctuations of the EM field, was predicted by H. Casimir in 1948 [2]. Up to now there is a significant variety of materials, especially metals like Au, used for measurements of the Casimir force. However, metals are not always suitable for device applications if attributes such as high durability combined with high stiffness and low thermal expansion are necessary. On the other hand a material that offers these properties is SiC, and it is currently utilized for precise instrumentation frames, as well as there is a possibility to be used in macro/nano assembly technologies [3-4]. Using an atomic force microscope (AFM) we performed measurements of the Casimir and electrostatics forces between an gold (Au) coated microsphere and doped silicon carbide samples. Finally we studied the implications on device actuation dynamics, which indicate that SiC can enhance the regime of stable equilibria against stiction as long as suitable compensation of electrostatic contributions is applied [4].

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