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Abstract

Diamond-like nanocomposite (DLN) thin films were deposited on pyrex glass or silicon substrate by plasma enhanced chemical vapor deposition (PECVD) method. These types of films have their unique number of structural, mechanical and tribological properties, which are quite similar with MEMS material properties. DLN films provide a number of unique and

attractive characterization properties that are unattainable from diamond-like carbon (DLC) films, silicon or other materials. These properties include high hardness, high modulus of elasticity, very low surface roughness, low friction coefficient, high tensile strength, low thermal expansion coefficient, good wear resistance property and biocompatibility. Due to these properties, DLN films can highly applicable in MEMS/NEMS devices. There are two different ways of applications of DLN films in MEMS/NEMS: either a surface coating material or a structural material. In this paper, we suggest the use of DLN films as a coating material mainly to improve the wear and friction of micro components and reduce stiction between microstructure and their substrate. The high mechanical properties of this type of DLN films exploited the design of high frequency resonator and comb driver for sensing and actuating applications. As a biocompatible material, we can use DLN films for detection of bio-molecules in biological research and disease diagnosis.

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