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Micro-characterization of diamond like carbon thin films on glass
JEREMY MCMINIS, RENE CROMBEZ, EVA MONTALVO, WEIDIAN SHEN, Eastern Michigan University — Diamond like carbon (DLC) coatings have been used with increasing increasingly in industrial, military, medical, and commercial applications due to their unique mechanical and thermal properties. To investigate the mechanical and tribological properties of a several nanometer thick DLC coating on glass substrate indentation and scratch tests were performed. A Nano-Indenter XP made by MTS equipped with a diamond indenter an a scanning probe microscope, the Nanoscope IIIa, made by Veeco were used to perform the indentation tests. A normal force was applied to a pre-determined maximum load while the displacement into the surface was monitored, resulting in the loading-unloading curves measing displacement as a function of force. Using this data the hardness and elastic modulus of the material can be measured. In the scratch tests the Nano Indenter XP was used to create scratches with an increasing normal load of up to 90mN while the real time displacement of, and lateral force on the tip were recorded. The SPM was then used to measure residual displacement and determine modes of damage along the scratch. Compared to Si_3N_4 and ZrO_2 coated glass, as well as uncoated glass, the DLC coatings showed unique properties which may be attributable to the large compressive stress in the films.

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