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Deposition of Diamond-Like Carbon (DLC) films by Metal Plasma Immersion Ion Implantation

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Metal plasma immersion ion implantation (MePIII) is a new technology combining filtered cathodic vacuum arc deposition and high frequency negative pulse voltage supplied to the sample stage. Its advantage is that it is easy to prepare a transitional surface with a gradually changing composition beneath the surface films so that it is possible to achieve good adhesion between the substrate and films. In this work, a several tens of nm thick carbon rich surface layer was formed in the matrix materials before DLC deposition. The composition and structure of the films were measured by Raman spectroscopy, infrared spectroscopy, and x-ray diffraction. The wear resistance and adhesion strength of the DLC films were tested by pin-on-disk experiments as well as heating and cooling process. Our results show that synthesized amorphous DLC film by this process possess good tribological properties and adhesion strength between the films and matrix.

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