Improved adhesion of DLC films on copper substrates by preimplantation

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Abstract

The adhesion of Diamond-like carbon films on copper substrates is usually very poor. If the DLC film is prepared by plasma based ion implantation and deposition, a preimplantation process step by plasma based ion implantation would be the ideal solution to increase the adhesion. Hence, metallic interlayers are not feasible. A carbon gradient layer, which can be obtained by the implantation of a hydrocarbon and which shows good results on a number of substrates, is not so effective on copper, though.

The effect of the implantation of several different gaseous species was investigated, as well as the influence of different treatment conditions (pulse voltage, treatment time). The adhesion was measured with a pull tester and additionally with a scratch tester. The samples were characterized by elemental depth profiling (XPS, SIMS) and Raman measurements. A considerable improvement of the adhesion was found for certain treatment conditions.

Keywords: PBII&D, DLC, adhesion, copper

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