Formation of Diamond-Like Carbon Films by Plasma-Based Ion Implantation and Their Characterization

Wolfgang Ensinger*

Department of Materials Science, Chemical Analytics, Darmstadt University of Technology
Petersenstr. 23, 64287 Darmstadt, Germany

(Received 29 November 2005; accepted 17 February 2006)

Key words: plasma-based ion implantation, plasma immersion ion implantation, diamond-like carbon, wear, corrosion, titanium, aluminum, steel

Plasma-based ion implantation (PBII) allows the formation of diamond-like carbon (DLC) films with excellent tribological properties. A large number of examples from the literature are discussed in detail, and the process parameters of PBII, such as plasma-forming gas, bias voltage, pulse length, pulse repetition rate and experimental setup, are correlated with the DLC film properties, such as bonding characteristics, stress, hardness, friction and wear behavior and corrosion protection ability. Trends in the variation of film features with the process parameters are shown, and the underlying physical processes are discussed.

*Corresponding author: e-mail: ensinger@ca.tu-darmstadt.de