

## Solid Lubrication Characteristics of DLC Coated Alumina Seals in High Temperature

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### **Solid Lubrication Characteristics of DLC Coated Alumina Seals in High Temperature**

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**Abstract :** Plasma immersion ion beam deposition (PIIBD) technique is a cost-effective process for the deposition of diamond like carbon thin film, the possible solid lubricant on large surface and a complex shape. We used PIIB process for the preparation of DLC thin film on  $Al_2O_3$  with deposition conditions of deposition temperature range 200 °C, working gas pressure of 1.310-1Pa. DLC thin films were coated by  $C_2H_2$  ion beam deposition on  $Al_2O_3$  after the ion bombardment of  $SiH_4$  as the bonding layer. Energetic bombardment of  $C_2H_2$  ions during the DLC deposition to ceramic materials generated mixed layers at the DLC-Si interface which enhanced the interface to be highly bonded. Wear test showed that the low coefficient of friction of around 0.05 with normal load 2.9N and proved the advantage of the low energy ion bombardment in PIIBD process which improved the tribological properties of DLC thin film coated alumina ceramic. Furthermore, PIIBD was recognized as a useful surface modification technique for the deposition of DLC thin film on the irregular shape components, such as molds, and for the improvement of wear and adhesion problems of the DLC thin film, high temperature solid lubricant.

**Key Words :** DLC thin film, Intermediate Layer, PIIBD, Adhesion, Alumin