

高速点火核融合実験用DLCコーンターゲットの開発 Development of DLC cone targets for fast ignition

古賀麻由子¹, 藤原関夫¹, 神田一浩¹, 藤岡慎介², 乗松孝好², 砂原淳³, 城崎知至⁴
KOGA Mayuko¹, FUJIWARA Etsuo¹, KANDA Kazuhiro¹, FUJIOKA Shinsuke², NORIMATSU Takayoshi², SUNAHARA Atsushi³, JOHZAKI Tomoyuki⁴

¹兵庫県立大学, ²阪大レーザー研, ³レーザー総研, ⁴広島大学

¹University of Hyogo, ²Institute of Laser Engineering, Osaka University, ³Institute for Laser Technology, ⁴Hiroshima University

Fast ignition is one of the proposed ways to achieve high fusion energy gain in inertial fusion research. For a successful ignition, it is necessary to transport the energy of fast electrons to the imploded core effectively. However, many researchers have reported that fast electrons were diverged more than expected [1, 2]. In addition, it is concerned that fast electrons are scattered by high-Z plasma generated from gold cone target. This may cause the drop of the energy coupling of the heating laser to the fast electrons [3]. Therefore, low-Z materials, are drawing attention as cone materials. In this study, we report the development of DLC cone targets for fast ignition experiments.

DLC layer were prepared on the brass conical bar by using plasma-based ion implantation and deposition (PBIID) system. The schematic diagram of the system is shown in Fig. 1. In this system, the RF for plasma generation is supplied to the substrate together with a negative high-voltage pulse for ion implantation through a single electric feed-through. We tried several preparation conditions and measured the properties of DLC layer. The thickness was measured by using a step gauge and a laser microscope. Near edge X-ray absorption fine structures (NEXAFS) were measured by using the beamline BL09A in NewSUBARU synchrotron radiation facility. It is found that low pressure and low RF power condition is suitable for DLC coating. sp^3 rich structure was observed in DLC prepared with acetylene gas. Details will be presented at the conference.

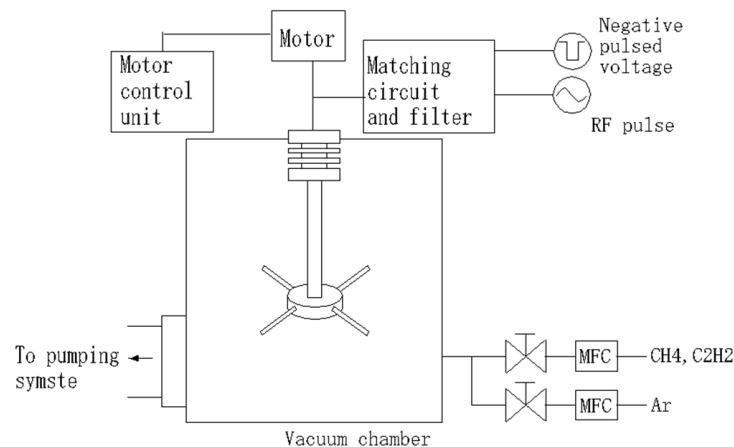


Figure 1: Schematic diagram of PBIID system.

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