

## Development of DLC cone targets for fast ignition

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Fast ignition is one of the proposed ways to achieve high fusion energy gain in laser fusion research. For a successful ignition, it is necessary to transport the energy of fast electrons to the imploded core effectively. Recently, many researchers have reported that fast electrons were diverged more than expected [1, 2]. Moreover, It is concerned that fast electrons are scattered by high-Z plasma generated from gold cone target [3]. This may cause the drop of the energy coupling of the heating laser to the fast electrons. Therefore, low-Z materials, such as CH and diamond like carbon (DLC) , are drawing attention as cone materials. The thick DLC layer is needed to make stand alone DLC cone. However, it is difficult because DLC has large residual stress. In this paper, we report the survey about preparation conditions and success in making DLC cone targets for fast ignition experiments.

We used plasma-based ion implantation and deposition (PBIID) system to make DLC cone targets. In this system, the RF voltage for plasma generation is supplied to the substrate together with a negative high-voltage pulse for ion implantation through a single electric feed-through. Therefore, this method is suitable for forming a film on a three-dimensional object. DLC layer was prepared on the brass conical bar. The thickness of DLC layer was measured by a step gauge. Near edge X-ray absorption fine structures (NEXAFS) were measured by using the beamline BL09A in NewSUBARU synchrotron radiation facility. It was found that the low gas pressure and low RF power were suitable for DLC coating. sp<sup>3</sup> rich structure was observed in DLC layer prepared with acetylene gas. Details will be presented at the conference.

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