

**THE CHARACTERISTIC CHANGE BY DISCHARGE
CURRENT AND THE DEPOSITION OF DLC FILM
FOR A PSEUDO-SPARK DISCHARGE PLASMA JET**

T.Kamada

*Hachinohe National College of Technology,
Hachinohe, Aomori, Japan*

M.Watanabe

*College of Science and Technology,
Nihon University, Chiyodaku, Tokyo, Japan*

T.Fujiwara

*Faculty of Engineering,
Iwate University, Morioka, Iwate, Japan*

Pseudo-spark discharge (PSD) [1] is a large current discharge with an especially geometrical shape of a pair of parallel disk electrodes at low pressure region on the left hand side of the minimum point of the Paschen curve. The plasma is spouted to outer region of the electrodes by improving a geometrical structure of the electrodes. The plasma is spouted in this mechanism is called a PSD plasma jet [2]. The plasma is effectively accelerated by the electromagnetic force to outside of the electrodes. The PSD is a large current discharge, but discharge craters are less than those of the arc discharge on electrodes. Consequently, it is advantage that impurities from the melted electrode to the plasma are less. And as current is raised, plasma density become high. In experiment using the double probe on hydrogen and maximum discharge current 10 kA (on the downstream of 22 mm from the anode), the density was of the order of 10^{20} m^{-3} , the flow velocity was approximately 4km/s and the arc spot was hardly observed on the electrodes. From these features mentioned above, it is considered that the PSD plasma jet is applied to the plasma source for the deposition of film. Because it is expected that deposition rate is high and the impurities are small in the film. In the presentation, it will be presented for the dependence on the discharge current for PSD plasma jet and the deposition of DLC film by PSD plasma jet.

Reference

- [1] J.Christiansen and Ch.Schultyeiss: Z. Phys. A 290 (1979) 35
[2] T.Kamada, T.Fjiwara, M.Itagaki, T.Ishikawa and W.Masayuki: J. J. Appl. Phys. 44 (2005) 6747

This work was supported by MEXT (or JSPS). KAKENHI (Grant-in-Aid for Young Scientists (B), 21760238).