

17p-F1-11

# 水素原子源付きプラズマ CVD で作製した炭素薄膜の堆積速度： 圧力と電極間距離への依存性

## Deposition Rate of Carbon Films Fabricated by H-assisted Plasma CVD: Pressure and Interelectrode Distance Dependence

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### 1. Introduction

So far, we have succeeded in controlling deposition profiles of carbon films on trench substrates using a H-assisted plasma CVD method, and realized sub-conformal, conformal, and anisotropic deposition profiles [1-3]. One remaining issue of our study is the low deposition rate. To increase the deposition rate, the simple and effective methods are to change the pressure and interelectrode distance in reactor. Here we report pressure and interelectrode distance dependences of deposition rate for carbon films.

### 2. Experimental

Experiments were performed using an H-assisted plasma CVD reactor, in which a capacitively-coupled main discharge and an inductively-coupled discharge of H atom source were sustained independently [4]. To obtain different interelectrode distance, a stainless steel stair with 4 layers (5 mm per layer) was placed in the centre of the substrate electrode. Toluene ( $C_7H_8$ ), Ar and  $H_2$  were supplied at flow rates of 5 sccm, 60 sccm and 30 sccm, respectively. The total pressure was set in a range of 0.1 - 2 Torr. The substrate temperature was 100 °C.

### 3. Results and Discussion

The deposition rate of carbon films as a function of interelectrode distance as a parameter of pressure is shown in figure 1. The deposition rate decreases with increasing the pressure from 0.1 to 0.5 Torr, and then it increases with increasing the pressure from 0.5 to 2 Torr. The deposition rate tends to increase with decreasing the interelectrode distance from 28 to 13 mm. The highest deposition rate of 28.7 nm/min is obtained

in the interelectrode distance of 13 mm at 2 Torr.

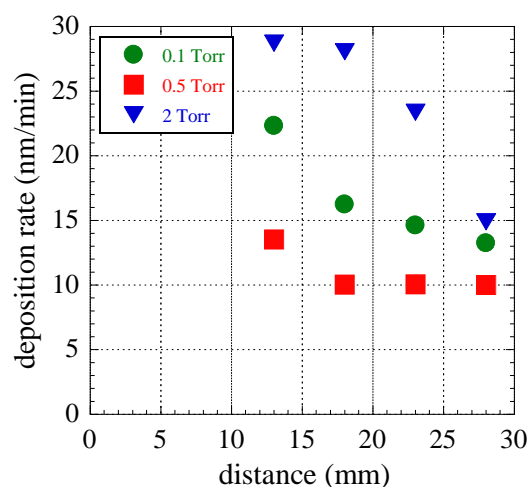


Fig. 1. Deposition rate of carbon films as a function of interelectrode distance as a parameter of pressure.

### 4. Conclusions

We have studied the pressure and interelectrode distance dependences of deposition rate by the H-assisted plasma CVD method. At the pressure of 2 Torr and in the interelectrode distance of 13 mm, the highest deposition rate of 28.7 nm/min is obtained.

### References

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