ECRCVD의 증착조건에 따른 비정질 수소화 탄소의 나노스케일 마찰특성연구

(The Effects of ECRCVD Deposition Conditions on Nanoscale Friction of Hydrogenated Amorphous Carbon Thin Film)

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1. INTRODUCTION

In recent years, the tribological characteristics of surface in nanoscale have become increasingly important because of increasing numbers of applications such as in microelectromechanical systems (MEMS)[1-2]. Hydrogenated amorphous carbon(a-C:H) is suitable material for reducing friction force among the contacted materials due to properties which are including hardness, chemical inertness and other good characterizations. Especially, a-C:H thin film prepared by ECRCVD (electron cyclotron resonance chemical vapor deposition) has a flat surface and polymeric property because it was deposited on much hydrogen contents plasma.

2. EXPERIMENTAL

The a-C:H films were deposited by an ECRCVD system using gas mixture of H_2 and CH_4. The substrates employed were B-doped Si (100) wafer cleaned method of RCA. The film deposited at a pressure below 5×10^{-7} Torr. The deposition is performed at a high working pressure and 500W microwave power. Nanoscale friction behavior and surface morphology were analysed by AFM / FFM (friction force microscopy). Fourier transform infrared (FT-IR) spectroscopy was analysed to obtain bonding characteristics and determine sp^3 and sp^2 concentration ratios.

3. RESULTS

The nanoscale friction behavior was influenced with different structures and different loads on the cantilever tip. As different loads on the cantilever tip, the films had different the friction coefficients. The different deposition conditions caused the change of the film structure. These films were deposited at a high deposition pressure and it contained much hydrogen contents. Therefore, a high deposition pressure made the polymeric structured a-C:H thin film, which have a outstanding flat surface. The deposition conditions influenced on the structures and the nanoscale friction behavior of a-C:H thin film.

4. REFERENCES

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