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Conductive DLC Film Deposition by Low Temperature Neutral Beam Enhanced Chemical Vapor Deposition

Institute of Fluid Science, Tohoku Univ.[1], Tokyo Electron Limited[2], Graduate School of Environmental Studies, Tohoku Univ.[3], *μSIC*, Tohoku Univ.[4], WPI-AIMR, Tohoku Univ.[5].
[O]Xijiang Chang[1], Yoshiyuki Kikuchi[1, 2], Masanori Nakano[3], Kumi Y. Inoue[3, 4], Tomokazu Matsue[3, 4, 5], Toshihisa Nozawa[2], Seiji Samukawa[1, 5]
Email: Samukawa@ift.tohoku.ac.jp

Diamond-like carbon (DLC) film has good chemical stability and mechanical properties so it is expected in many fields such as electronic, mechanical and biomedical applications. Researchers reported the electrochemical behavior of DLC for some redox species [1]. As the superior biocompatibility and wide potential window for carbon electrode, DLC is a competitive candidate as the material for electrochemical sensor electrode. Recently, Bio-LSI has been developed as an advanced bio-sensing device for electrochemical bio-imaging [2]. In this application, conductive DLC electrodes can provide high sensitive bio-imaging platform for wide applications. To apply DLC film in this use, the challenge is to carry out the deposition in low temperature because the integrated transistors in Bio-LSI can't be processed with high temperature. In this study, we performed the DLC film deposition in low temperature with neutral beam enhanced chemical vapor deposition (NBECVD).

The NBECVD device is detailed descried in Ref. 3, in which the conductive amorphous hydrocarbon (aCH) is successfully deposited in low temperature. The deposition schematic diagram is shown in Fig. 1.

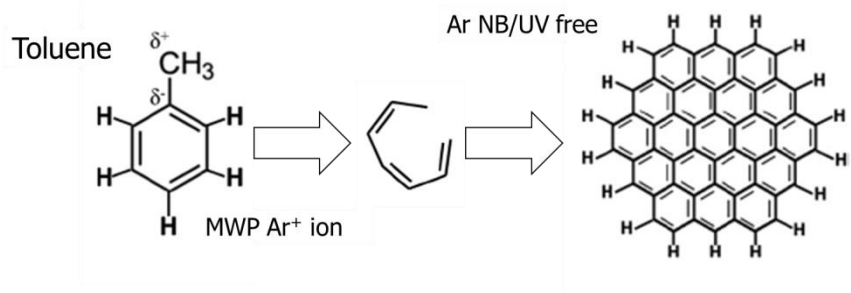

Fig. 1 Schematic of conductive DLC film fabricated by NBECVD

In this case, we used 8 inch Si wafer with 100 nm Pt layer as the substrate to improve the adhesion between the DLC film and substrate. To improve conductivity, N_2 and H_2 were used in the deposition process to make N doping. As a result, we obtained high conductive N-doped DLC film. We also tested the voltammetry property and found it has been significantly improved. With this improvement in electrochemical property, this DLC film can be applied in the Bio-LSI fabrication in soon future. More experimental details and results will be presented in the conference.

References:

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