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Conductive DLC Film Prepared by NBECVD for Bio-LSI Sensor

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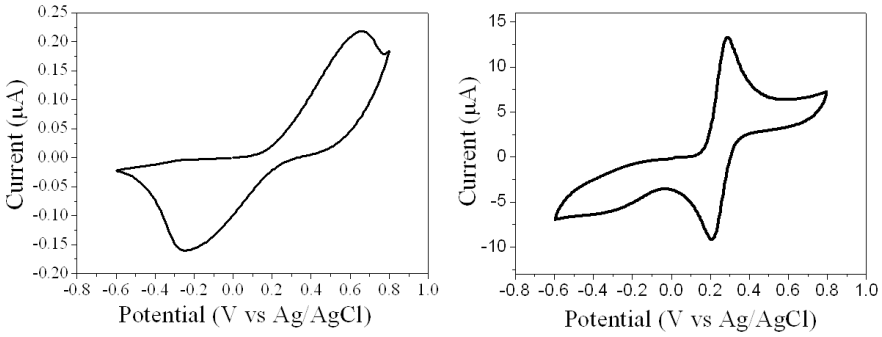
Recently, Bio-LSI has been developed as advanced bio-sensing device for electrochemical bio-imaging and attracting more and more interest. One significant topic is to find suitable electrode material, which can provide high sensitive bio-imaging platform for wide applications. Diamond-like carbon (DLC) 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]. DLC has much wider potential window than traditional metal electrode so it is a promising candidate electrode material for Bio-LSI sensor. 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. 2, in which the conductive amorphous hydrocarbon (aCH) is successfully deposited in low temperature. 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. As a result, we obtained high conductive N-doped DLC film with a significantly improved voltammetry property shown in Fig. 1. 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.



(a) (b)

Fig.1 Cyclic voltammograms of N-doped DLC film in 2.0 mM ferrocenemethanol (FMA) with 0.1 M KCl solution: (a) deposited on Si in Ref.3; (b) deposited on Pt sputtering substrate

References:

[1] Z. G. Lu, C. Y. Chung. Diam. Relat. Mater. 17 (2008) 1871-1876.
[2] Y. Kikuchi, A. Wada, et al. Carbon 67 (2014) 635-642.