

PO4015

Synthesis of highly adhesive and hard amorphous carbon films on Silicon and PTFE substrates by dual magnetron sputtering for sensing applications

Rajesh Ganesan, Kerstin Thorwarth, Rajesh Ganesan, Ainhoa Prado, Roland Haurt,
Hans-Josef Hug

EMPA Swiss Federal Laboratories for Mate, Dübendorf, Switzerland

rajesh.ganesan@empa.ch

Hard amorphous carbon deposited on silicon and polymer substrates can be easily used for electrochemical sensing applications. Owing to the difference in the film stress between substrate and depositing film with high hardness, a weak film/substrate adhesion shortens the working device lifetime. In this work, the energetically deposited carbon films on silicon substrates or PTFE substrates exhibit improved adhesion to HF1 level based on the generation of thick film/substrate interface of about 8 nm due to subplantation of deposits by energetic bombardment, and on the film stress values limited to 3.5 GPa. Apart from excellent adhesion, the films demonstrate good homogeneity, excellent electrical conductivity and superior electrochemical performance when doped with Cr (2%) by dual magnetron sputtering. Moreover, this approach opens up new avenues to the fabrication of thin amorphous carbon film electrodes by lithography.

Keywords

undoped and metal-doped amorphous carbon

HiPIMS

hardness

electrochemical sensing

adhesion