Surface Functionalization of a-C/ZnO Core-Shell Nanowires Based on Self-Assembled Monolayers for Biosensor Applications

Deepti Sharma, 임연호[1,*], 김진태[1],
Khan Mohammad Rizwan[1], 육영근[1], 구아영[1], 서지혜[1]
전북대학교; [1]전북대학교 화학공학과
(yeonhoim@jbnu.ac.kr*)

We present the biomolecules immobilization on amorphous carbon (a-C)/Zinc Oxide (ZnO) core-shell nanowires (NWs) using NH3 plasma treatment and a self-assembled monolayer (SAM). NH3 plasma treatment was carried out in an Inductively Coupled Plasma (ICP) system in order to create amine group onto the surface of the a-C/ZnO core-shell NWs. For generation of SAMs, we employed an O2 plasma treatment method for the formation of hydroxyl group onto the surface of a-C/ ZnO/ core-shell NWs. Finally, the biomolecules such as anti-AFP antibody could be immobilized to the hydroxylated a-C/ZnO core-shell NWs via a terminal amine (NH2) functional group which linked with the assembled SAM layer formed by treatment with APTES and glutaraldehyde. Analysis of the functional groups on the surface of the a-C/ZnO core shell NWs was performed using Fourier Transform Infrared Spectroscopy (FT-IR). In this work, we demonstrate that antibodies bind covalently and non-covalently with and without SAM, respectively on the surface of a-C/ZnO core-shell NWs.