Fabrication and Characterization of Carbon Nanotube Doped Organic Solar Cells

Sever, Yaren

Today,the increase in population and rapid depletion of nonrenewable energy sources brings the need for energy.In this case,scientists are forced to develop technologies by using renewable energy sources.Sun is the unlimited and renewable energy source. Organic solar cells(OSC) absorb the light from the sun by the active polymer layer and transform it to electrical power.OSCs are advantageous than inorganic ones because of being low-cost,easy-to-use,proper for large scale applications.In this project,it is aimed to produce OSCs by using specific amounts of modified carbon nanotube(CNT) doping. According to this aim,it is detected by using the fluorescence spectroscopy that CNTs can be used in OSCs.The homogenous distribution of doping SWCNT into donor material was displayed by Atomic Force Microscopy(AFM) and correct proportion of SWCNTs are chosen by those images.SWCNTs modified by binding oleyl amine.In order to increase the efficiency of OSC,modified SWCNT doped P3HT was used as donor.The acceptor was PCBM.Surface characterization of prepared cells was made by AFM while electrical characterization of them is done with airless environment cabin(glove-box)system in nitrogen environment.As a result,modified SWCNTs created new charge paths in P3HT:SWCNT%:PCBM devices.Short circuit current obtained was raised from the reference.The efficiency increased according to the traditional or non-modified SWCNTs doped OSC. In this project,certain amounts of non-modified carbon nanotube doped OSCs which are highly efficient rather than traditional OSCs and which are low-cost, easy-to-produce rather than inorganic solar cells. SWCNTs were modified by binding oleyl amine as functional group. This modification will cause to increase the efficiency of OSC.

Awards Won: