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PEDOT:PSS/Graphene oxide-silver nanowires paper electrodes by using Triton X-100 to enhance the driving properties of electroactive polymer actuators

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Recently, ionic electroactive polymers (ionic-EAPs) have received much attention because they have many advantages such as flexibility, light weight, high displacement, and low voltage activation. Typically, ionic-EAPs have a simple structure including platinum electrodes and ionic polymer membrane by electroless plating process. However, the electroless plating process is complex and takes a long time nearly for 2 weeks, and when ionic EAPs driving in open air, micro-cracks formed on the platinum electrode surfaces and it lead to decrease driving performance. A paper-shaped electrode by Graphene oxide (GO) can easily be fabricated as an electrode for ionic EAPs. Also, a wire shaped electrode has been suggested as substitutes to solve the micro-crack problems. Unfortunately, there still exist problems related with durability and stability during large deformation driving. PEDOT:PSS is a kind of conductive polymer and usually used for protecting layer for flexible electrode. But, flexibility of the PEDOT:PSS layer is low due to aggregated nanocrystals. Triton X-100 is non-ionic surfactant, which is able to change the form of typical aggregated nanocrystals of PEDOT:PSS to nanowires. In this work, we fabricated the composite paper electrodes consisting GO, silver nanowires(Ag-NWs) through filtration system and they were applied to ionic polymer membrane. The post-treated PEDOT:PSS by Triton X-100 is deposited on the GO-Ag NWs composite paper electrodes by spin coating. As a result, we suggest ionic EAP actuators based on wire-shaped PEDOT:PSS/GO-Ag NWs composite electrodes by using PEDOT:PSS treated with Triton X-100.

Biography

Seokju Yoo has completed her bachelor's degree at the age of 26 years from Inje University. He is currently pursuing his master degree at the department of Nanoscience and Engineering, Inje University, Korea. He will acquire his Master degree next year. He is conducting research on solar cells, flexible electrodes, and IPMCs. He can operate furnace, chemical vapor deposition (CVD), scanning electron microscope (SEM), atomic force microscope (AFM).

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