Carbon matrix supported MEA for P'EMFCs

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Abstract

As concerns in climate change have been increasing, research on eco-friend energy resources has been a key issue in the scientific field. In line with such efforts, due to their high efficiency and power density, polymer electrolyte membrane fuel cells (PEMFCs) are evaluated as high potential energy conversion devices adequate for the upcoming hydrogen-based society.

However, obstacles are apparent to the commercialization of PEMFCs. One main problem is the cost of the system which a significant proportion is allocated to the price of the platinum catalyst. This affects the overall cost to be higher than conventional power generators. To overcome this hurdle, researchers try to alleviate the expense by reducing the total amount of platinum group material or by improving the ability of the catalytic reaction.

In this study, the advantages of carbon nanofiber matrix supported MEA were investigated to maximize the dispersion, utilization of platinum particles and thus, the performance of the full cell. The MEA was assembled with electrospun carbon nanofibers, offering sub-100 nm diameters, with platinum particles loaded on its outermost surface for easy diffusion of the redox materials. Therefore, the fabricated MEA shows exceptional performance due to the high platinum utilization and facile mass transfer.