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Fluorinated ethylene-propylene/graphite composites with single-walled carbon nanotubes for fuel cell bipolar plates

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Abstract: In recent years, there has been an increasing number of fuel cell applications for different modern technological devices. Among fuel cells, the phosphoric acid fuel cell (PAFC) has attracted significant interest as an attractive power source because of its long-term stability; PAFCs are known to be able to run for more than 10 years. The most important component in the PAFC is the bipolar plate (BP), which constitutes 60–80% of the total weight and 30–40% of the total cost. BPs have been made with metals such as stainless steel, aluminum, and titanium. Metal-based BPs exhibit an excellent electrical conductivity, high mechanical strength, and low production cost. However, they are often damaged by corrosion from phosphoric acid, which reduces the electrical performance at high operating temperatures. For alternative metal-based BPs, polymer/carbon composite BPs (PCBPs) have been used for high-temperature PAFC systems. Herein, we report a novel method for the fabrication of highly conductive fluorinated ethylene-propylene (FEP)/graphite nanocomposites for application to high-temperature bipolar plates (BPs) by incorporating well-dispersed single-walled carbon nanotubes (SWCNTs) as a secondary filler in the FEP matrix. The SWCNTs were pre-dispersed with FEP powder by sonication in ethanol and subsequently mixed with graphite powder by ball milling.

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Publications :

1. Lee MH, Kim HY, Oh SM, Kim BC, Bang D, Han JT, Woo JS (2018) Structural optimization of graphite for high-performance fluorinated ethylene-propylene composites as bipolar plates. Int. J. Hydrogen Energ. 43:21918-21927.
2. Hwang H-C, Woo JS, Park S-Y. (2018) Flexible carbonized cellulose/single-walled carbon nanotube films with high conductivity. CarbohydPolym., 196:168-175.
3. Han JT, Kim BK, Woo JS, Jang JI, Cho JY, Jeong HJ, Jeong SY, Seo SH, Lee G-W. (2017) Bioinspired multifunctional superhydrophobic surface with carbon-nanotube-based conducting pastes by facile and scalable printing. ACS Appl. Mater. Interfaces, 9:7780-7786.
4. Woo JS, Lee G-W, Park S-Y, Han JT. (2017) Rapid transformation of transparent conducting films into superhydrophobic conductive films. RSC Adv., 7:17173-17177.
5. Choi H, Woo JS, Han JT, Park S-Y. (2017) Fabrication of water-dispersible single-walled carbon nanotube powder using N-methylmorpholine N-oxide. (2017) Nanotechnology, 28:465706.

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