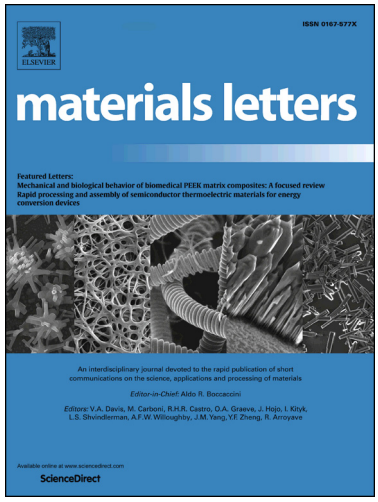

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Template synthesis of micro/mesoporous Cl-doped polypyrrole using vapor phase polymerization

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Abstract

Template synthesis of polypyrrole (PPy) in three-dimensional interconnected channels was attained using vapor phase polymerization by the oxidation of pre-adsorbed pyrrole within a microporous metal-organic framework of $[Cu_3(btc)_2]_n$ (btc = benzene-1,3,5-tricarboxylate) upon exposure to $FeCl_3$ vapor. The formation of Cl-doped PPy was confirmed by material characterizations. Moreover, the product exhibited interesting microstructure features with an octahedron-like shape and high porosity, possibly a result of the $Cu_3(btc)_2$ template. The BET surface area of the porous PPy was 455 m^2/g and its pore size was distributed in the range of 1 – 10 nm. In preliminary measurements of cyclic voltammetry, the micro/mesoporous PPy-modified electrode exhibited a higher quasi-reversible electrochemical response for ferricyanide than a bare glass carbon electrode.

Keywords: polymers; porous materials; chemical vapor deposition

1. Introduction

Conducting polypyrrole (PPy) and its nanostructures have attracted tremendous attention due to their promising applications in batteries, energy storage, electronic devices and sensors [1-3]. The use of hard templates such as anodic aluminum oxide, track-etched polymer membrane and mesoporous silica is probably