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A highly conductive poly(3,4-ethylenedioxythiophene):poly(styrene sulfonate) film with the solvent bath treatment by dimethyl sulfoxide as cathode for polymer tantalum capacitor

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Abstract

The highly conductive poly(3,4-ethylenedioxythiophene):poly(styrene sulfonate) (PEDOT:PSS) films were prepared on porous tantalum pentoxide surface as cathode for polymer tantalum capacitors (PTC). The electrical performances of PTC with PEDOT:PSS films as cathode were optimized by dimethyl sulfoxide (DMSO) bath treatment. With the DMSO-bath treatment of PTC, the equivalent series resistance (ESR) of PTC decreased from 25 mΩ to 9 mΩ. The ultralow ESR led to better capacitance-frequency performance. The device reliability investigation revealed the enhanced environmental stability of PTC. The enhanced performances were attributed to the conductivity improvement of PEDOT:PSS cathode films and the removal of excess PSS from PEDOT:PSS films.

Keywords: polymer tantalum capacitor; PEDOT:PSS; DMSO; equivalent series resistance.

1. Introduction

Due to the high stability, excellent reliability and volumetric efficiency, the polymer tantalum capacitors (PTC) have been broadly employed [1,2]. The sintered tantalum powder structure makes

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