



Review

A critical review on intrinsic conducting polymers and their applications

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Abstract

In the last two decades, conductive polymer (CPs) materials have replaced metals and semiconductors in a variety of commercial applications, including energy storage and conversion, biomedical devices such as drug delivery and bioactuators, and electronic devices such as sensors, due to their superior electrical and electrochemical properties. Therefore, researchers have paid a great deal of attention to CPs in order to investigate new fundamental structures synthesized via diverse methods. In addition, the invention of nanomaterials has instigated the improvement of different properties of CPs, such as electrical, chemical, flexible structure, and tunable conductivity features. This paper aims to review the electrical and electrochemical conductivity mechanism of CPs and overview the common CPs with excellent electrical properties. Moreover, the current research discusses different synthesis methods used to prepare CPs. Furthermore, the effect of various carbon nanofillers on the electrical properties of CPs and the various factors affecting the electrical conductivity of CPs are examined in depth. In conclusion, the most recent applications and prospective aspects of CPs are investigated to demonstrate their remarkable potential features among metals and semiconductors.