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4.12 - Processing of thin-film electrode based supercapacitors: Progress during the last decade

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Abstract

A thin-film electrode (TFEs) is one of the emerging technologies utilized in thin film supercapacitors (SCs). The thickness of the active materials loading ranges from a few nanometer to micrometers, not only facilitates better electrochemical reaction during charging discharging but also allows use in flexible and portable miniaturized electronic devices as uninterruptible power supply. Consequently, the TFEs have gained remarkable attention to the worldwide scientific community as alternative energy storing processes. In these regards, new research for active electrode materials, separators, electrolytes and fabrication technology are the most essential requirements for the satisfaction of future energy demands. This book chapter provides a glimpse of the recent advancement of the active materials used in TFEs, different TFEs fabrication processing approaches and recent discoveries regarding innovative SCs device technologies. In this context, most recent promising active materials are metal organic frameworks (MOFs) for wearable topologies, and symmetric, asymmetric, and in-plane arrangements are all addressed in depth. Finally, in this perspective discussion, three interesting potential outcomes- the fabrication of hybrid SCs, exploring the profile evaluation of novel materials, and creating affordable, large-scale and environmentally friendly TFEs for SCs has been explored. In this light, it is anticipated that the chapter will be beneficial for future high-performance TFE based supercapacitor design and fabrication as well as their continued use in cutting-edge energy storage technologies.

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Structural and antibacterial behaviors of tin dioxide thin films on copper substrates

2025, Journal of Science Advanced Materials and Devices

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