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Abstract	:	This review explores the innovative role of polymer electrolytes in energy storage systems, emphasizing their characteristics, fabrication methods, and practical applications in advanced electrochemistry. It begins by outlining various types of polymeric material, including conductive polymers, redox-active polymers, and polymer electrolytes, that improve the lifetime, efficiency, and capacity of energy storage devices. A comprehensive review of polymeric electrochemistry is provided, focusing on how polymers maintain electrical insulation and enable ion transport, two essential functions for devices such as supercapacitors and batteries. Advanced fabrication techniques, including solution casting, melt processing, electrospinning, and in-situ polymerization are emphasized for tailoring polymer electrolytes to achieve optimal microstructural and electrochemical properties. The study further explores the electrochemical characteristics of polymer electrolytes, focusing on the electrochemical impedance spectroscopy technique. By offering a thorough understanding of both the theoretical and practical aspects of polymer electrolytes, this study contributes to the development of more effective and long-lasting energy storage systems. This discussion aligns with the global trend toward innovative and eco-friendly energy technologies while advancing the field of materials research.