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## **Review—Polymer Electrolytes for Rechargeable Batteries: From Nanocomposite to Nanohybrid**

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### **Abstract**

Rechargeable batteries are becoming increasingly important for our daily life due to their strong capability of efficiently storing electric energy under chemical form. The replacement of conventional liquid electrolytes with polymer electrolytes (PEs) has been deemed as one of the most viable solutions towards safer and higher energy density electrochemical energy storage systems which are coveted for e-mobility applications (e.g., electric vehicles, EVs). In recent years, the introduction of inorganic materials into PEs has captured escalating interest, aiming at harmonizing advantages from both organic and inorganic phases. In this review, we present the progress and recent advances in PEs containing nano-sized inorganic materials, with due attention paid to the role of inorganic phases on the physical and chemical properties of the electrolytes. The paradigm shift from composite polymer electrolytes (CPEs, obtained by physical blending) to hybrid polymer electrolytes (HPEs, obtained by chemical grafting) is highlighted and the possible improvement and future directions in CPEs and HPEs are discussed.

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