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INFLUENCE OF WATER ADDITION IN DEEP EUTECTIC SOLVENT-BASED ELECTROLYTES FOR APPLICATION IN ELECTROCHEMICAL SUPERCAPACITORS

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Resumo:
In today's world, energy storage devices are indispensable for both domestic and industrial applications. The escalating demand for energy has spurred research into these devices, leading to enhancements in efficiency and environmental compatibility. In particular, batteries and supercapacitors have emerged as promising solutions due to advancements in their constituent elements. A critical component of these devices that has seen substantial progress is the electrolyte. Electrolytes serve a pivotal role in these devices by facilitating the movement of positively and negatively charged ions in opposite directions across the electrolytic medium. Supercapacitors primarily employ three types of electrolytes: aqueous, organic, and ionic liquids. Recently, the literature has explored a class of electrolytes known as deep eutectic electrolytes (DES). A DES is typically composed of two or more components that are solid at room temperature (25ºC), but when mixed in the right proportions,

they become liquid at the same temperature. One drawback of aqueous electrolytes is their maximum potential window of 1.2V. Since the capacitance of a supercapacitor increases proportionally with the potential window, efforts have been made to expand the maximum potential window of water. This study investigated the impact of varying water proportions on DES. We used electrodes sourced from commercial supercapacitors for our experiments. The supercapacitors were electrochemically characterized using cyclic voltammetry with a sweep rate range of 1mV.s-1 to 300 mV.s-1, galvanostatic cycling with current densities from 10 to 30 mA.g-1, and electrochemical impedance in the frequency range of 1mHz to 100 KHz, varying the voltage from 0V to 1V."