

REDOX BEHAVIORS OF P AND N TYPE COMPOUNDS AS NEGATIVE ELECTRODE MATERIALS FOR SODIUM AQUEOUS BATTERIES

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The increasing importance of renewable energy sources like sunlight and wind power connected to the electrical grid has triggered the necessity of low cost energy storage systems. In this context, sodium aqueous electrolyte ion-batteries constitute a new promising technology, which reduces the cost, risk and environmental impact compared to other battery technologies. Today, the performances of these batteries are limited however, by low capacity negative electrodes. To address this issue, the electrochemical and physical behavior of several n and p type derivatives have been investigated in neutral Li, Na, K and Mg aqueous supporting electrolytes. The long term cyclability of diimide compounds involves close to one electron leading to high capacity values (approx. 90-100 mAh/g) at low voltage. Very interestingly, electrochemical activity shows singular features that unraveled a solid state disproportional mechanism favors by the unstability of the radical anion. Conversely, the extent of this reaction can be modulated according to the polarisability of the counter cation or the extent of the conjugated backbone. Results also enable to rationalize the capacity retention and the self discharge mechanisms of these materials based on both morphological and side reaction considerations. Our work also relates to soluble n type derivatives. Thanks to pi-staking interactions on a carbon based electrode such materials can be reversibly cycled in the adsorbed state at low potential. The electrochemical behavior as well as the long term stability on cycling will be presented.