



**11th Conference on
POLYIMIDES**

June 2-5, 2019

***University of
Montpellier***

ABSTRACT BOOK

CHAIRS

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Comparison of Various Dehydrating Agents for Organic Battery Electrolytes

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It is known that the presence of water in organic electrolytes adversely affects the width of the working window of potentials, in which the processes of charge-discharge of batteries based on intercalation compounds of alkali metals occur. The purpose of this work is to reduce the water content in the organic electrolyte to an acceptable value.

For drying, one of the common electrolytes for sodium ion batteries 0.5 M NaPF₆ EC / DMC (1:1) was used. Freshly calcined calcium oxide and 4Å molecular sieves were used as desiccants. To determine the background current, cyclic voltammetry was performed with a sweep rate of 10 mV/s in a three-electrode cell with platinum as an auxiliary electrode, sodium iron-sulfate reference electrode, and also aluminum foil as a working electrode. Determination of water content in solutions was carried out by Karl Fischer titration tests.

Initially, the water content in the used electrolyte reached about 1350 ppm of water, while the working window of potentials was half a volt. The use of calcium oxide, taken in an equivalent amount relative to water, made it possible to reduce the water concentration to 850 ppm. The background current did not exceed 1 µA in the range of -0.75-1.25V. The use of 4Å molecular sieves reduced the water content to 250 ppm. Despite the still high water content in the electrolyte, the working potential range was -3.0-2V, which is quite an acceptable result.

Thus, it was found that the drying of the organic electrolyte with 4Å molecular sieves made it possible to increase the width of the potential window to 5 volts, which is an acceptable result in comparison with the use of a calcium oxide desiccant.