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Na-ion batteries: an emerging technology

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Energy storage possesses an important role in order to rationalize the use of both fossil and renewable energy sources. Scientists are looking for inexpensive and green energy storage systems. The development of sodium ion batteries is moving at a much faster rate and its use in the market is expected to be in near future. Very promising results have been reported in the recent past showing the performances of the sodium ion batteries very competitive for stationary energy storage [1, 2].

Energy density values of 210 Wh/kg can be obtained by using some specific electrode materials with an average cell potential of 3.3 V. A great range of compounds is being studied as possible cathode materials for Na-ion batteries, from oxides $Na_x[Fe_{1/2}Mn_{1/2}]O_2$ to phosphates $NaFePO_4$, fluorophosphates $Na_3V_2O_{2x}(PO_4)_2F_{3-2x}$ (where $0 \leq x \leq 1$). Regarding the negative electrode, unlike the lithium ion batteries, the inability of sodium to insert into graphite is promoting the use of hard carbons and sodium alloys composites as anode materials.

The electrolyte is the key for the successful of sodium ion batteries. New polymer nanohybrids materials, exhibiting conductivities of around 10^{-5} S cm^{-1} at 25ºC and good mechanical properties, have been recently developed which can be used as polymer electrolytes for all solid state Na-ion batteries.

In this talk we will present a general overview of the most interesting materials for Na-ion batteries and the relationship between the structure and the electrochemical properties of these compounds.

References:

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