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Sodium for securing future renewable energy supply

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The storage and recovery of electrical energy is widely recognized as one of the most important areas for energy research. Although renewable energy such as i.e. wind and solar generated electricity is becoming increasingly available in many countries including Australia, these sources provide only intermittent energy. Thus, energy storage systems are required for load levelling, allowing energy to be stored and used on demand. Energy storage in rechargeable batteries and supercapacitors is the most promising prospect for ensuring consistent energy supply [1-2] therefore allowing greater penetration of renewable energy into the electricity grid. Energy storage capability also has obvious benefits in terms of greenhouse emissions.

Issues such as the environment, the rapid increase in fossil fuel prices, and the increased deployment of renewable energy sources, provide a greater need for the development of electrochemical energy storage, especially for large-scale applications. Thus, materials research and computational modelling play a key role in making further progress in the field of energy storage.
Energy storage devices based on sodium have been considered as an alternative to traditional lithium based systems because of the natural abundance, cost effectiveness and low environmental impact of sodium. Phosphate materials such as NaNiPO4, NaMnPO4, NaCoPO4 and NaNi1/3Mn1/3Co1/3PO4 will be discussed at the conference. Sodium transition metal phosphate has served as an active electrode material for an energy storage device [3-4]. The development of sodium transition metal phosphate with special emphasis on structural changes and novel synthetic approach can underpin technological advancements in small renewable energy harvesting and power generation technologies. The characteristics of the fabricated device such as improved storage capability, cycling stability, safety and economic life - cycle cost made this an attractive alternative to conventional charge storage devices using more expensive materials.

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