High Energy Density Na-ion Battery Technology

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From a materials cost and safety standpoint, non-aqueous electrolyte sodium-ion (Na-ion) batteries represent an attractive alternative to their lithium-ion (Li-ion) counterparts [1,2]. In this presentation we will demonstrate the electrochemical performance characteristics of prototype Na-ion cells constructed using a proprietary layered oxide cathode $Na_aNi_{(1-x-y-z)}Mn_xMg_yTi_zO_2$ and a hard carbon anode material [3].

Faradion has developed its Na-ion battery technology to a point where performance characteristics, such as specific energy, rate capability and cycle life, are competitive with commercial Li-ion cells. Data will be presented to support these observations. Performance details will also be presented on next generation active materials and electrolytes suitable for both energy and power applications. Furthermore, the company has established the technology offers significant advantages for transportation purposes whereby its Na-ion cells may be rendered essentially safe by storage at the zero energy state (0 V) [4].

To demonstrate the commercial viability of Na-ion batteries, Faradion has worked with its partners to scale-up its Na-ion cell chemistry to the 12 Ah (38 Wh) cell level. These prototype Na-ion cells are manufactured on commercial Li-ion production lines using readily available equipment. Pouch, cylindrical and prismatic cell designs are possible. These prototype cells deliver a specific energy of around 140 Wh/kg at 100 % depth-of-discharge and have been incorporated successfully into E-Bike (>400 Wh) and E-Scooter (>750 Wh) demonstrator packs [5,6].

The company has now fabricated well over 5 kWh of these prototype cells for various demonstrator purposes. These recent developments have encouraged further commercial scale improvements and allowed rapid access to new market opportunities. Details on these commercial developments will be discussed.

References:

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[4] J. Barker and C.J. Wright, US Patent Application 20170237270. Storage and/or Transportation of Sodium-ion Cells, Filed August 2014
[5] J. Barker and C. J. Wright, Presentation at the Advanced Automotive and Stationary/Industrial Battery Conference, AABC, Detroit, Michigan, USA, June 2015.
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