

REVISIT MULTIVALENT BATTERY SYSTEM

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In the quest for new rechargeable battery technology to overcome Li-ion batteries, multivalent batteries are one of the possible options. Indeed in multivalent systems, the ions transport more than one charge such as 2 in the case of divalent Mg^{2+} or Ca^{2+} ions and even 3 in the case of trivalent Al^{3+} . [1, 2] For magnesium, proof-of-concept has been achieved with complex electrolyte compositions enabling electrodeposition (plating) coupled to covalent host cathodes to diminish columbic interactions. [3, 4] Recently Mg-type battery has known a regain of interest with especially the development of several new classes of electrolytes. [5] The latest one is based on a halogen free electrolyte which presents the advantage to diminish strongly the corrosion of current collector and/or battery casing. [6] On the other hand, the possibility of developing a secondary battery based on calcium has been much less investigated since a previous study concludes about the impossibility to electrodeposit calcium. [7] Being the 5th most abundant element on earth and having the second most electronegative theoretical potential after Li^+/Li , we decide to revisit the possibility to use Ca metal as an anode in rechargeable system. In this report, we will demonstrate the possibility to plate and strip calcium in conventional alkyl carbonate electrolytes at moderate temperature. Finally, the prospects of developing a new calcium based rechargeable battery technology will be discussed. [8]

References:

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