High Power-High Energy NASICON-Type Sodium Cathodes

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Sodium ion batteries are one of the realistic promising alternatives to the lithium analogues. However, neither theoretical energy/power density, nor the practical values reach the values of Li-cathodes. Poorer performance is expected owing to larger size, larger mass and lower cell voltage. Nonetheless, sodium ion batteries are considered to be practically relevant in view of the abundance of the element Na. The arguments in favor of Li and to the disadvantage of Na would be completely obsolete, if the specific performance data of the latter would match the first.

However, developing high power and high energy sodium batteries is still a significant challenge. At present, sodium layered oxides and polyanionic-type compounds have extensively investigated as sodium cathodes. Particularly, NASICON-type cathodes, such as $Na_3V_2(PO_4)_3$ and $Na_3V_2(PO_4)_2F_3$, have a great potential as high power-high energy sodium cathodes. Here we show that by investigation transport parameters and rational structure design, high performance NASICON-type sodium cathodes can be successfully obtained,[1],[2] which even with the potential of outperforming Li cathodes in terms of rate capability. [3],[4]

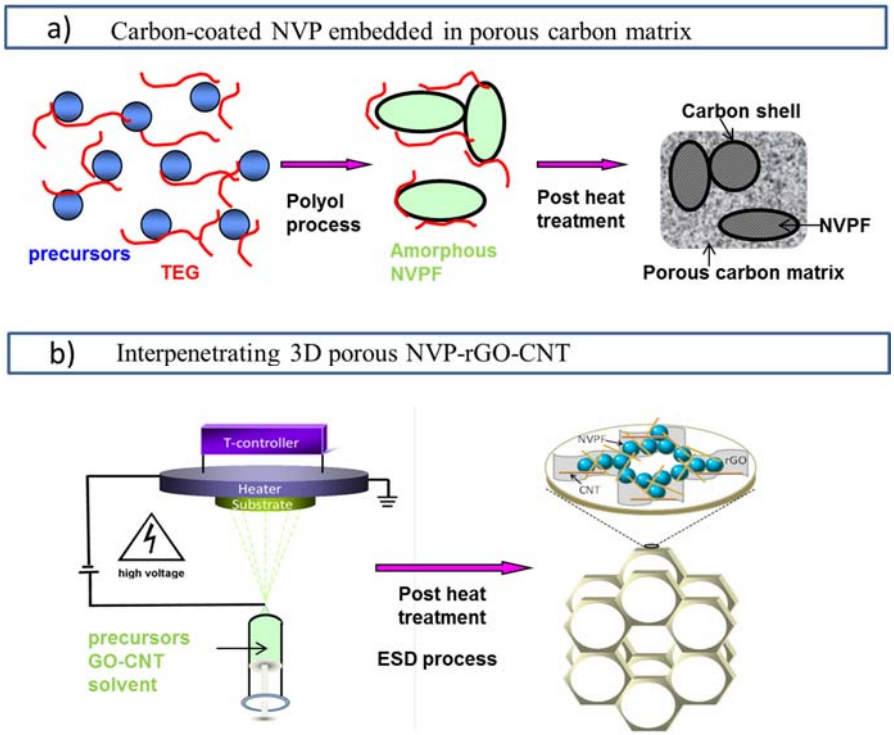

Fig.1 Schematic illustration of the fabrication of high power NVP: a) double carbon-embedding method; b) ESD method.

References:

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