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Short communication

Sol–gel synthesis and controlled sintering of silver vanadium oxide

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Abstract

A two part synthesis process is used to prepare pure silver vanadium oxide (SVO) with desired properties. First, a low temperature sol gel process is used to generate SVO feedstock materials. These materials can then the sintered using varied time and temperature profiles to generate SVO with desired physical characteristics.

Keywords: Sol gel; Lithium; Battery; Vanadium; Silver vanadium oxide; Cathode

Silver vanadium oxide (SVO) has made a significant impact as a cathode material in primary lithium batteries for implantable medical devices. Specifically, Li/SVO batteries are able to produce the high pulse currents required for the operation of implantable cardiac defibrillators (ICDs).

A new process is described here for preparing pure SVO with desired physical properties. Mixtures of V_2O_5, LiOH, and stoichiometric quantities of Ag containing salts were placed in water, heated to ~95 °C, and stirred for several hours. After removing the water, the samples were dried at 120 °C, ground, and passed through a 35 or 45 mesh screen. The resulting

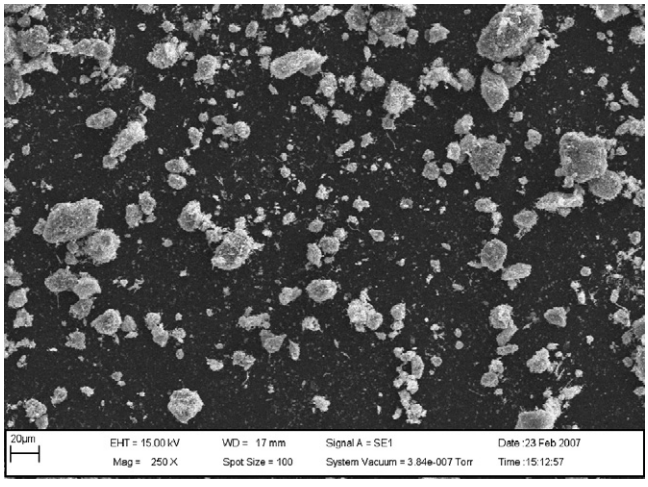

Fig. 1. 250× SEM of sol–gel produced SVO.

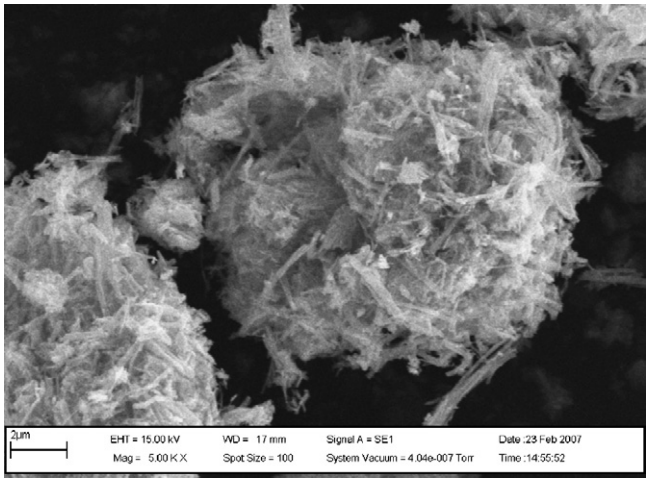

Fig. 2. 5k× SEM of sol–gel produced SVO.

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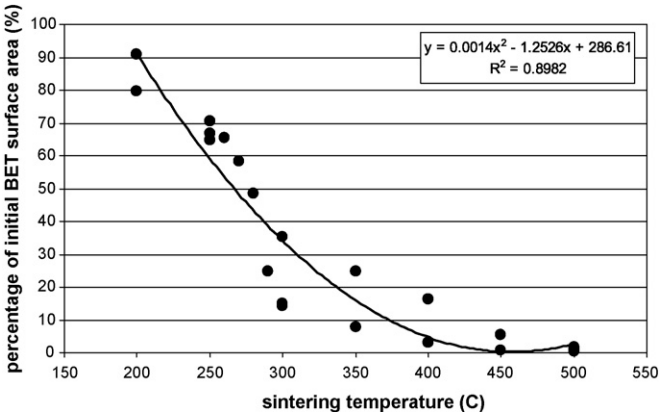

Fig. 3. SVO surface area as a function of sintering temperature.

sol–gel produced SVO feedstock materials had high surface areas (38–73 m^2/g) and moderate crystallinities (33–54%). The sol–gel produced SVO materials formed agglomerates 1–50 μ in diameter (Fig. 1), while the primary particles had submicron dimensions (Fig. 2).

The SVO feedstock materials were then sintered using varied time and temperature profiles. Via careful control over sintering conditions, SVO with desired physical characteristics was produced (Fig. 3).