Supplementary information.

S.1 (a,d,e)



The phase purity of the products was examined by X-ray diffraction (XRD) .It can be seen that the obvious diffraction peaks of ϵ -LiV₂O₅ is good agreement with JCPDS card No. 01-0089-8320, ICSD- 88643 with the lattice constants a =11.3552, b = 4.65, c =3.5732 nm of space group Pmn.^{1b}

Two weak peaks at $2\theta = 38.1$ (111) and 44.3° (200) characteristic of silver^{4, 4a}. The high intensity peak at $2\theta = 19.0^{\circ}$ is interesting because it is combination of silver (19.0)⁴ with LVO shown by (*). It is concluded that due to the layered LVO, silver is intercalated and forms nanocomposites with excellent morphology under the present synthetic conditions. The strongest peak (#) indicates the plane of the layered LVO structure and it does inter layer spacing. The domain structure influences the intensities and line widths of all reflections.^{1d,8} The intensity of (#) peak is very high which is a significant Li⁺ transport in oxide of vanadium and can be determined to be in the (010) direction. At given temperature, the conductivity in the (010) is more than 1 order of magnitude higher than other direction. This indicates electron conduction preferentially depends on concentration of lithium nuclei is high in the (010) direction. The XRD pattern indicates that LVO/ Ag can be obtained, under current synthetic conditions. XRD pattern of LVO/Ag does not shown any change in the crystal lattice but abruptly changed in the morphology. Importantly, as concentration of lithium salt increases the agglomeration will be more preferably and form a stone like structure as shown in above Figs from (e-a).

The conductivity is enhanced in reported sample. Whereas the conductivity predominantly decreases in all other samples because of low diffusitivity of Li, unsuccessful intercalation of silver, change in the molar concentration of reactant. (The conductivity is in the range of 0.1- 0.5 S/cm)

Synthesis details:

| Code | Composition | Morphology | Remarks |
|-------------|------------------------------------|------------------|-----------------|
| 1A:1B:0.25C | 0.3gm A + 1.1B gm + 0.11 | High width and | As shown S1 a |
| | gm C | compact NT's | |
| | | with silver | |
| 1A:1B:0.5C | 0.3gm A + 1.1B gm + 0.22 gm | switch to tubes | As shown S1 b |
| | С | and aggregation | |
| 1A:1B:1C | 0.3gm A + 1.1 gm B + 0.44 | Aggregation | As shown S1 c |
| | gm C | | |
| 1A:1B:1.5C | 0.3gm A + 1.1B gm + 0.66 | Small stone like | |
| | gm C | structures are | |
| | | formed | |
| 1A:1B: 2C | 0.3gm A + 1.1B gm + | Clear stones are | As shown S1e |
| | 0.88gm C | formed | |
| 1A:1B:0.1C | 0.3gm A + 1.1B gm + 0.04 gm | NTs of LVO | As presented in |
| | C | with silver | manuscript. |

A= Ammonium metavanadate, B= Silver Nitrate, C= Lithium nitrate

Characterization details

The nanostructure of the products was examined with field emission scanning electron microscopy (FESEM, HITACHI S-4800).XRD patterns of different composition sample were recorded on Brucker D8-advance X-ray diffractometer with Cu KR radiation ($\lambda = 1.5418$ Å), the operation voltage and current maintained at 40 kV and 40 mA, respectively.

S.2. Surface area report of LVO/Ag NTs as reported in manuscript.

Single Point Surface Area at P/Po 0.201

Single Point Surface Area at P/Po 0.20107490: 7.0509 m²/g

BET Surface Area: 8.2771 m²/g

BJH Adsorption Cumulative Surface Area of pores between 1.700000 and 300.000000 nm Diameter: 8.1479 $\rm m^2/g$

BJH Desorption Cumulative Surface Area of pores between 1.700000 and 300.000000 nm Diameter: 7.5921 $\ensuremath{\,\mathrm{m^2/g}}$

Volume

Single Point Adsorption Total Pore Volume of pores less than 79.7494 nm Diameter at P/Po 0.97511241: 0.023882 cm³/g

Pore Size

Adsorption Average Pore Diameter (4V/A by BET): 11.5412 nm BJH Adsorption Average Pore Diameter (4V/A): 19.0432 nm BJH Desorption Average Pore Diameter (4V/A): 25.0486 nm

S.3. FTIR of LVO/Ag NTs as reported in manuscript.

FT-IR spectroscopic studies were conducted. In the IR spectrum of silver-LiV₂O₅ nanocomposite, three characteristic vibrational bands at 1480, 1435, and 865 cm⁻¹ were detected. The first two bands corresponded to stretching and the last one is bending vibration from an lithium source ^{15a, b} the structure of which was observed in the XRD patterns possibly because of its trace /micro amount and weak /strong X-ray scattering density. (Fig.3) Other impurities of lithium source may not interrupted because of acidic medium.⁸ In the IR spectrum, the relative intensity of the band at 542 cm⁻¹ is strongly decreased due to introduction of Ag + into the LVO nanotubes⁴ framework, which interrupts the linkages of Li- O-V and produces more edge-sharing V-O bonds and terminal V=O bonds. The band at 748 cm⁻¹ could be assigned to a V=OH₂ stretching mode due to coordinated water. It is very strong evidence where the four major absorption bonds at 1025, 824, 600 and 473 cm⁻¹, which have been associated with the V₂O₅ are absent in Ag-LVO.¹



S.4. Electrochemical performance of sample 1A:1B:0.1C



All electrochemistry measurements were conducted in a three-electrode cell, and the working electrode was prepared by casting a nafion-impregnated composite sample onto a glassy electrode. The electrolyte used is a 0.5 M H₂SO₄ aqueous solution. The cyclic voltammograms of the nanotubes electrodes with a potential window from -0.7 to 0.7 V as shown in S a, and the representative charge/discharge curves at a current density of 0.1 A/g are shown in S b. The average specific capacitance values, C_{avg} (F/g) of the sample were estimated from the discharge process according to the following equation $Cg = I\Delta t / \Delta V * m$ where I is the current loaded (A), Δt is the discharge time (s), ΔV is the potential change during discharge process, and m is the mass of active material in a single electrode (g). All specific capacitance data under the first and fifth cycle with different current loadings are approximately same. It can be seen that the CV curve of Ag-LVO shows only one pair of redox peaks (*) at each scan rate due to the transition between Ag/Ag⁺ states. The CV curve indicating good charge propagation within the electrode. However, the specific capacitance is less than 124 F/g.

We have also presented the electrochemical performance Ag-LVO nanocomposite nanotubes, which indicate the volume capacitance of as synthesized and tested product is about 124 F/ g which is higher 3 times higher than reported¹⁶ with good cyclability. However, the capacitance of LVO is reported as 42 F/g 16 which depends upon the expansion of nanotubes per mole. In cyclic voltammetry (CV) study there are redox peaks (*) at each scan rate indication of silver is in different state. i.e. Ag+ and Ag0The potential of using Ag-LVO as electrode materials for supercapacitor was tested by standard cyclic voltammetry (CV) and galvanostatic charge-discharge technique.