Supporting Information

New strategy for synthesizing yolk-shell $V_2O_5$ powders with low melting temperature for high performance Li-ion batteries

You Na Ko,$^{ab}$ Yun Chan Kang$^a$ and Seung Bin Park$^b$

$^a$Department of Chemical Engineering, Konkuk University, 1 Hwayang-dong, Gwangjin-gu, Seoul 143-701, Korea

$^b$Department of Chemical and Biomolecular Engineering, Korea Advanced Institute of Science and Technology, 291 Daehak-ro, Yuseong-gu, Daejeon 305-701, Korea

This file includes:

- Morphologies of the $V_2O_3$-C precursor powders directly prepared by spray pyrolysis at various temperatures.
- XRD patterns of the $V_2O_3$-C precursor powders, combusted $V_2O_5$ powders at different temperatures and dense structured $V_2O_5$ powders.
- Morphologies of the $V_2O_5$ powders obtained by combustion of $V_2O_3$-C composite powders at different temperatures.
- TG curves of the $V_2O_5$ powders combusted at 300 and 400 °C.
- TEM images of the dense structured $V_2O_5$ powders prepared by spray pyrolysis.
Fig. S1 Morphologies of the V$_2$O$_3$-C precursor powders directly prepared by spray pyrolysis at various temperatures; (a) 600 °C (b) 700 °C, (c) 800 °C, (d) 900 °C, and (e) 1000 °C.
Fig. S2 XRD patterns of the the V$_2$O$_3$-C precursor powders, combusted V$_2$O$_5$ powders at different temperatures and dense structured V$_2$O$_5$ powders.
Fig. S3 Morphologies of the V$_2$O$_5$ powders obtained by combustion of V$_2$O$_3$-C composite powders at different temperatures; (a) TEM and (b) dot-mapping images of the powders combusted at 300 °C, (c) SEM image of the powders combusted at 500 °C, (d) SEM image of the powders combusted at 600 °C.
Fig. S4 TG curve of the V$_2$O$_5$-C composite powders combusted at 300 °C.
Fig. S5 TG curve of the yolk-shell V$_2$O$_5$ powders combusted at 400 °C.
Fig. S6 (a) low-resolution TEM and (b) high-resolution TEM images of the dense structured V$_2$O$_5$ powders prepared by spray pyrolysis.