Electronic Supporting Information (ESI) for

Graphene oxide assisted spontaneous growth of V_2O_5 nanowires at room temperature

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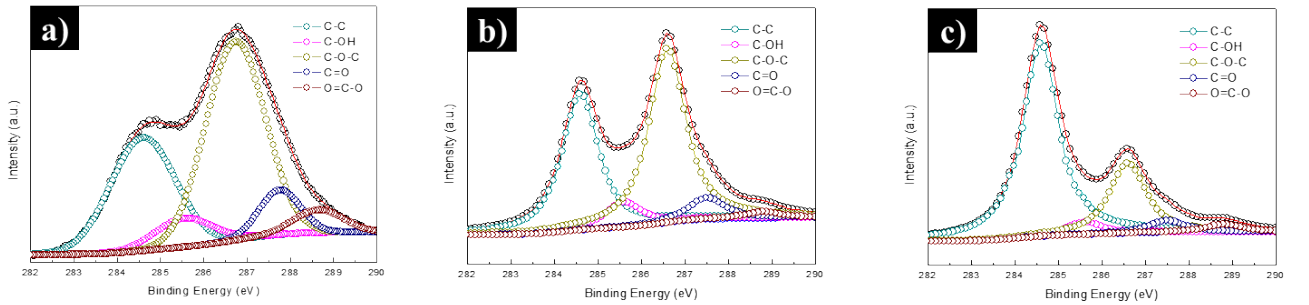
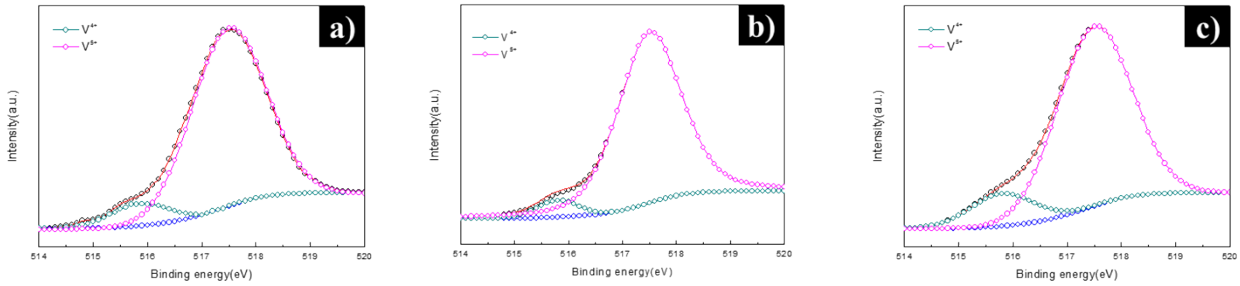


Peak	Position	Area	Portion
C-C	284.6	38273.535	30.5%
C-OH	285.6	6399.837	5.1%
C-O-C	286.7	67512.006	53.8%
C=O	287.8	8031.168	6.4%
O=C-O	288.8	5270.454	4.2%

Peak	Position	Area	Portion
C-C	284.6	46994.61	37.4%
C-OH	285.6	8839.609	7%
C-O-C	286.7	59975.37	47.8%
C=O	287.5	7455.152	5.9%
O=C-O	288.8	2224.282	1.8%

Peak	Position	Area	Portion
C-C	284.6	45679.21	67.3%
C-OH	285.6	11450.06	4.1%
C-O-C	286.6	8154.803	22.9%
C=O	287.5	3874.426	3.9%
O=C-O	288.8	1318.802	1.7%

Figure S1. C1s XPS spectra for (a) GO and G-VONs mixed after (b) 1day, and (c) 8weeks.



Peak	Position	Area	Portion
V^{4+}	515.8	3036.23	8.78%
V^{5+}	517.5	31545.03	91.2%

$V^{4+}/V^{5+} = 0.096$

Peak	Position	Area	Portion
V^{4+}	515.8	1143.069	5.2%
V^{5+}	517.5	20650.29	94.8%

$V^{4+}/V^{5+} = 0.055$

Peak	Position	Area	Portion
V^{4+}	515.8	6415.801	13.3%
V^{5+}	517.5	41719.67	86.7%

$V^{4+}/V^{5+} = 0.153$

Figure S2. (a) $V2p_{2/3}$ XPS spectra for VO, (b) G-VONs mixed after 1day, and (c) 8 weeks.

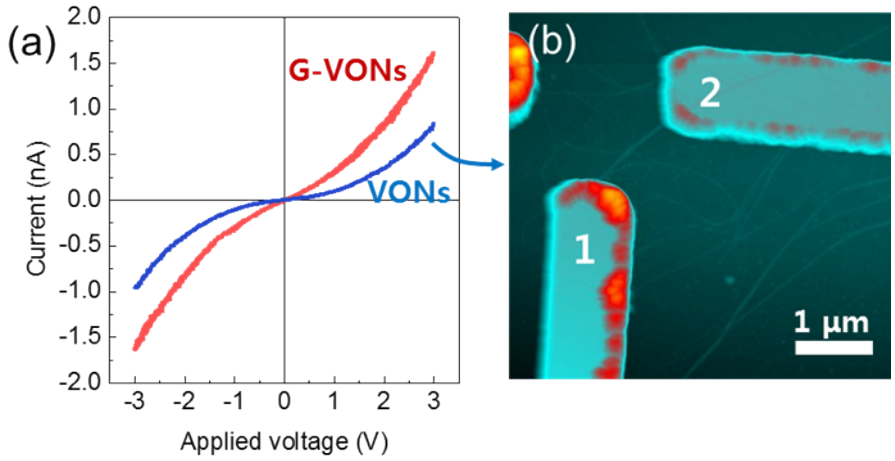


Figure S3. (a) Comparison of I-V characteristics between single G-VONs and VONs at room temperature. (b) AFM image of the device for the I-V characteristics of VONs.

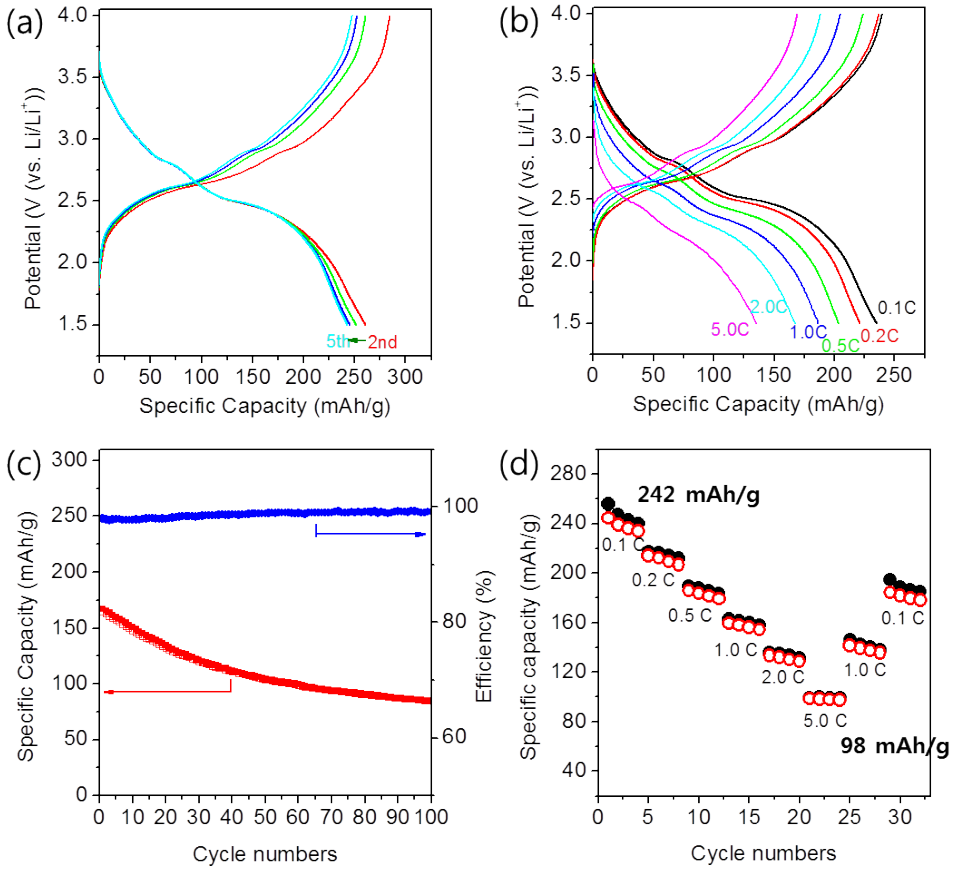


Figure S4. (a) The specific capacity of G-VONs at a current density of 40 mA/g. (b) The rate capability of G-VONs as a function of the current density. (c) The cyclability of G-VONs at current density of 800 mA/g with coulombic efficiency of 98% after 100 cycles. (d) The rate capability with various current densities for five cycles. Black filled circles and red circles represent the capacities for discharging and charging processes, respectively.

To characterize the electrochemical performance of the G-VONs, we measured the specific capacity and rate capability. Figure S4 (a) shows the charge/discharge curves of G-VONs treated at 300 ºC at a current density of 40 mA/g. The specific capacity of the second discharge profile is 260 mAh/g. This value is comparable or larger than those of the previous reports.[S1-S4]

In the case of the rate capability after five cycles, as the current density increased from 0.1 C to 5.0 C (1.0 C of current density is 400 mA/g), the specific capacity decreased from 234 to 135 mAh/g as shown in Fig. S4(b). Although the capacity is reduced as the current density increases, it is important to note that the high specific capacity of ~ 84 mAh/g even at the current density of 800 mA/g with a coulombic efficiency of 98 % is maintained after 100 cycles (Fig. S4(c)). Furthermore, the specific capacity of 98 mAh/g is retained at the current density of 2000 mA/g (Fig. S4(d)). This indicates that G-VONs can be a candidate as an energy-storage material in applications such as rechargeable Li-ion batteries.

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