

Supplementary Information

for Journal of Materials Chemistry A, DOI: 10.1039/((please add manuscript number))

Role of Mn substituent in $\text{Na}_3\text{V}_2(\text{PO}_4)_3$ for high-rate sodium storage

Jae-Sang Park, Jongsoon Kim, Jae Hyeon Jo, and Seung-Taek Myung*

*Department of Nano Technology and Advanced Materials Engineering & Sejong Battery
Institute, Sejong University, Gunja-dong, Gwangjin-gu, Seoul 05006, South Korea*

*Corresponding author

E-mail: smyung@sejong.ac.kr (S. Myung)

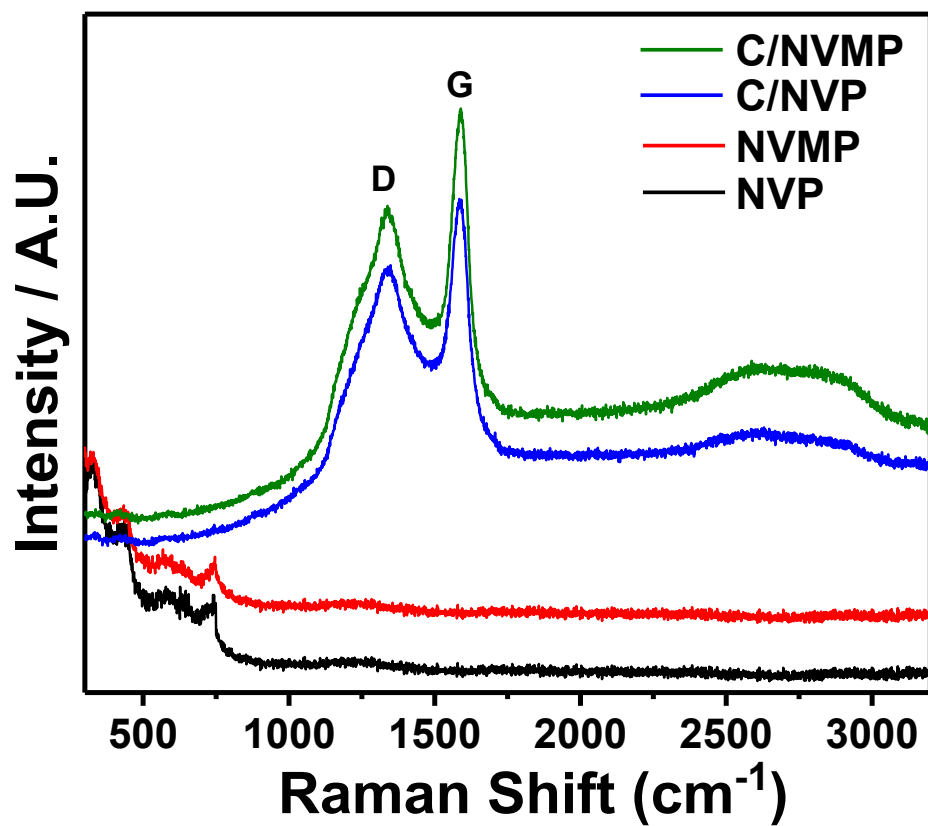


Fig. S1. Raman spectra of NVP, NVMP, C/NVP, and C/NVMP.

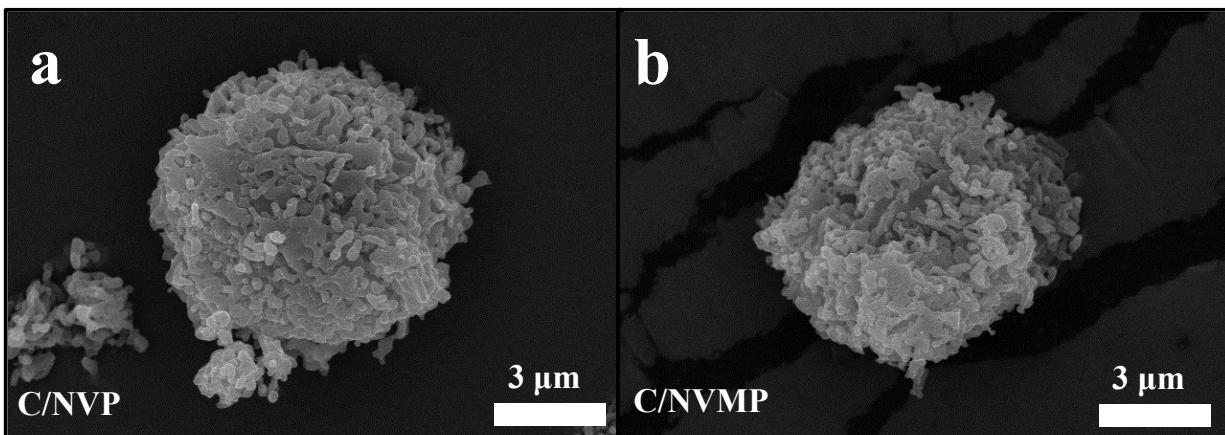


Fig. S2. SEM images of as-synthesized (a) C/NVP and (b) C/NVMP powders.

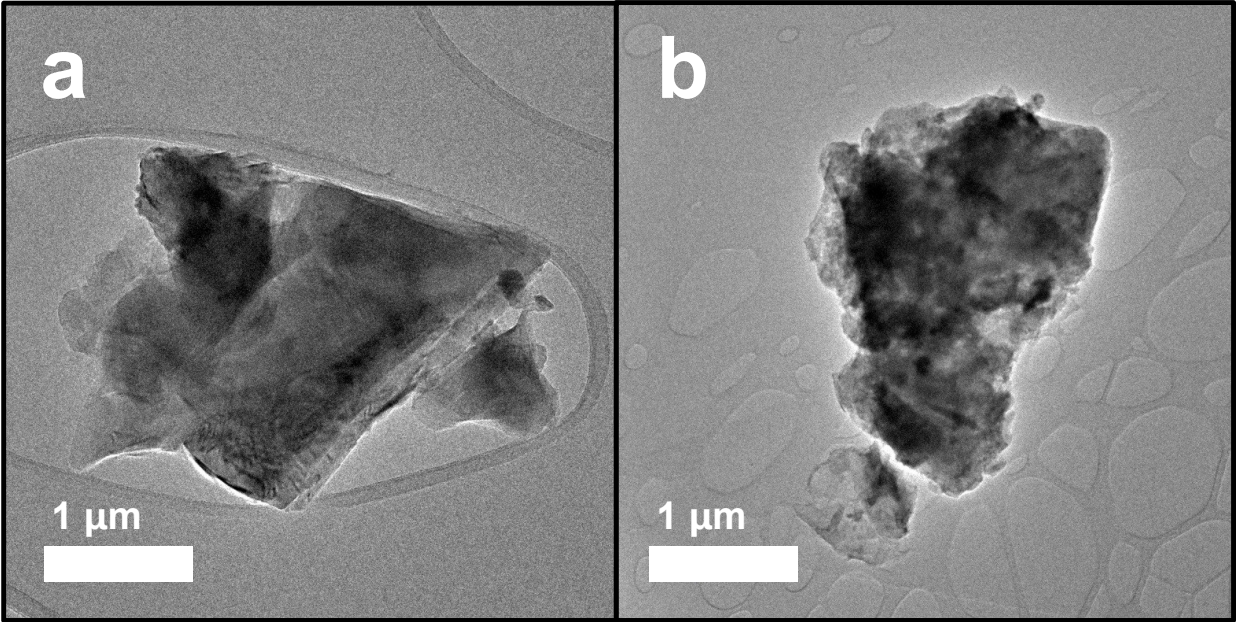


Fig. S3. TEM images of as-synthesized (a) NVP and (b) NVMP observed at low magnification.

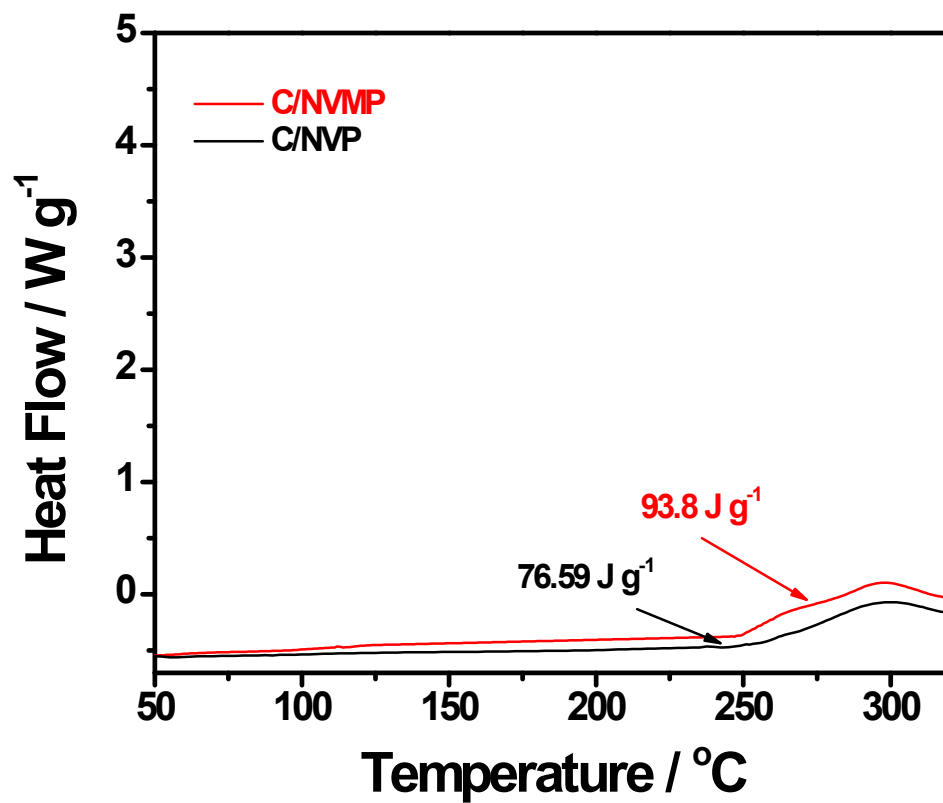


Fig. S4. DSC curves of fully desodiated (a) C/NVP and (b) C/NVMP electrodes.

Table S1 Rietveld refinement results of XRD data for NVP, NVMP, C/NVP, and C/NVMP.

Crystal system		Rhombohedral			
Space group		<i>R -3 C</i>			
		NVP	NVMP	C/NVP	C/NVMP
Cell Parameters	<i>a</i> / Å	8.7277(4)	8.7427(3)	8.7296(1)	8.7429(1)
	<i>b</i> / Å	8.7277(4)	8.7427(3)	8.7296(1)	8.7429(1)
	<i>c</i> / Å	21.8154(5)	21.7953(1)	21.8188(6)	21.7970(5)
Rp / %		8.44	9.95	8.46	9.75
<i>R</i> wp / %		11.1	14.0	11.2	13.5

Table S2 Rietveld refinement results of XRD data for extensively cycled NVP, NVMP, C/NVP, and C/NVMP.

Crystal system		Rhombohedral			
Space group		<i>R -3 C</i>			
		NVP	NVMP	C/NVP	C/NVMP
a / Å	Phase 1	8.7193(4)	8.7376(4)	8.7208(9)	8.7366(5)
	Phase 2	8.4262(8)	8.4874(1)	8.4551(3)	8.4882(8)
b / Å	Phase 1	8.7193(4)	8.7376(4)	8.7208(9)	8.7366(5)
	Phase 2	8.4262(8)	8.4874(1)	8.4551(3)	8.4882(8)
c / Å	Phase 1	21.7972(5)	21.7915(3)	21.8050(3)	21.7916(7)
	Phase 2	21.4794(5)	21.4855(7)	21.5964(5)	21.5063(6)
R _p / %		13.7	13.9	14.2	14.5
R _{wp} / %		13.3	13.6	13.9	14.2

Phase 1: Na₃[V_{2-x}Mn_x](PO₄)₃ phase (x = 0, 0.1).

Phase 2 : Na_{3-d}[V_{2-x}Mn_x](PO₄)₃ phase (x = 0, 0.1) (Na-deficient phase).