Supplementary material for

Phase transition of SiC support induces dispersed Na_2WO_4 catalyst for CH_3Cl-to-C_2H_3Cl conversion

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Equations:

Selective coupling of methyl chloride to vinyl chloride (MCTV)

The CH_3Cl conversion, products selectivity and yield were calculated using the following equations:

$$CH_3Cl\ Conv. = \frac{|CH_3Cl_{inlet}| - |CH_3Cl_{outlet}|}{|CH_3Cl_{inlet}|} \times 100\%\#(1)$$

$$C_2H_3Cl\ Sel. = \frac{2 \times |C_2H_3Cl|}{|CH_3Cl_{inlet}| - |CH_3Cl_{outlet}|} \times 100\%\#(2)$$

$$C_2H_3Cl\ Yield = CH_3Cl\ Conv. * C_2H_3Cl\ Sel. * 100\%\#(3)$$

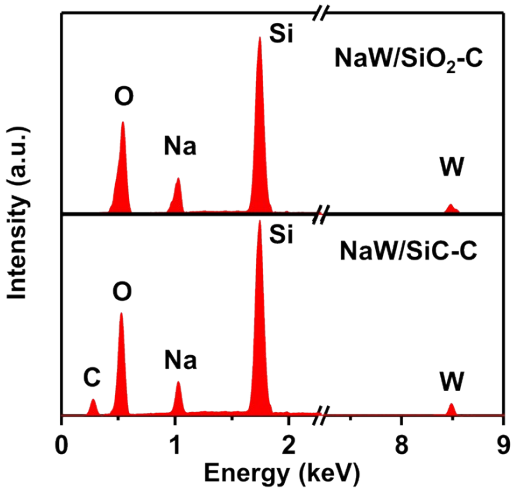

Figure S1. Elemental analysis of NaW/SiO_2-C and NaW/SiC-C by EDS.

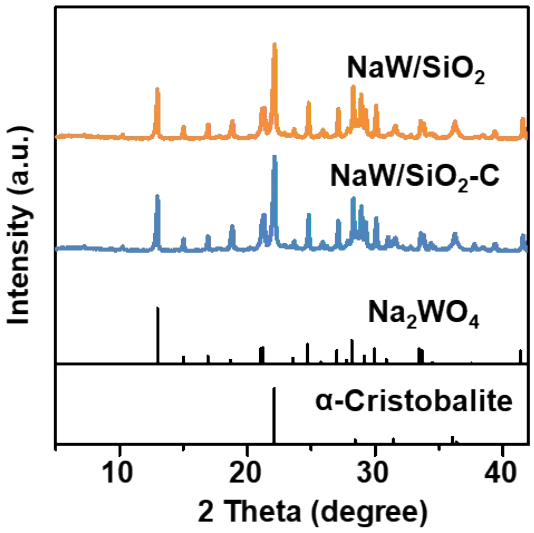

Figure S2. XRD pattern for catalyst before (NaW/SiO_2) and after calcination (NaW/SiO_2-C) using α-cristobalite as support.

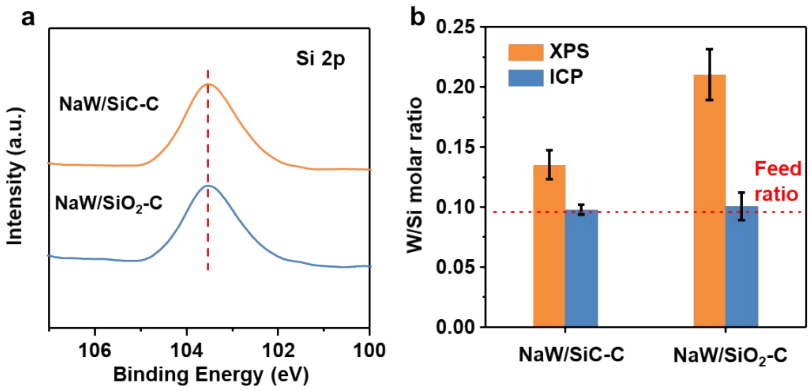

Figure S3. a) Si 2p of NaW/SiC-C and NaW/SiO_2-C catalysts. b) Quantitative determination of the surface W/Si atomic ratios in NaW/SiC-C and NaW/SiO_2-C catalysts by XPS and ICP-MS.

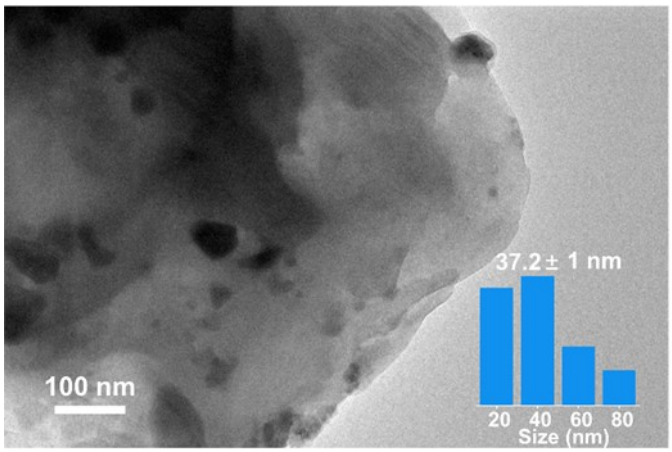

Figure S4. HRTEM image and particle size statistics of NaW/SiO_2-C catalyst.

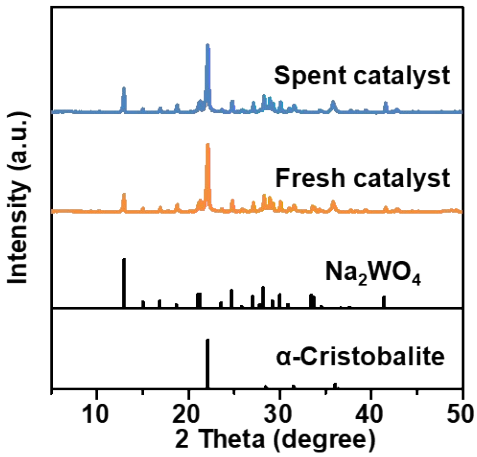

Figure S5. XRD pattern of fresh and spent NaW-SiC-C catalyst for long-term stability test.

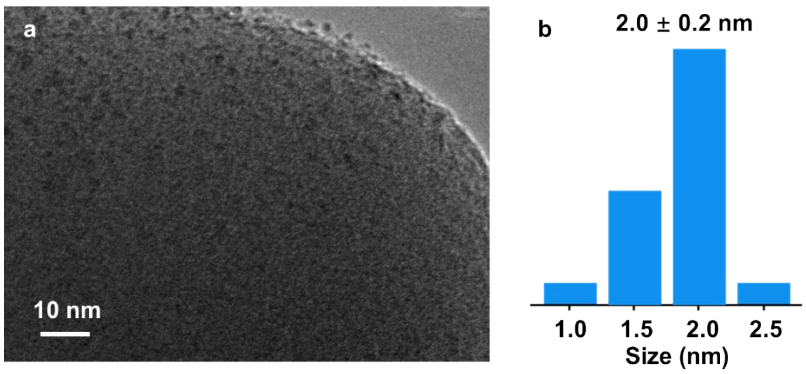

Figure S6. a) HRTEM image of spent NaW/SiC-C catalyst after long-term stability test. b) Particle size distribution of Na_2WO_4 species on spent NaW/SiC-C catalyst.

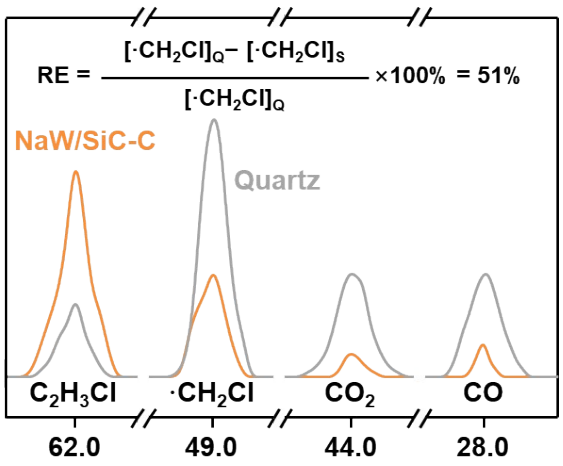

Figure S7. C_2H_3Cl, CH_2Cl, CO_2 and CO signals detected by in-situ SVUV-PIMS of NaW/SiC-C and quartz, respectively.

Table S1. Elemental composition of NaW/SiO_2-C and NaW/SiC-C by EDS.

Catalysts	Atomic ratio (%)				
	C	Na	O	Si	W
NaW/SiO_2-C	0.00	5.88	64.63	26.59	2.90
NaW/SiC-C	0.64	5.79	63.90	26.80	2.87

Note: Based on the elemental ratios determined by EDS, the mass fraction of the remaining SiC in NaW/SiC-C is calculated to be ~1 wt%. This result indicates that only a small fraction of the β-SiC support retained its original phase after high-temperature treatment.

Table S2. The signal intensity of $\cdot CH_2Cl$, C_2H_3Cl, CO_2 and CO of the catalysts detected by in-situ SVUV-PIMS and the calculated reaction efficiency (RE) value of $\cdot CH_2Cl$.

Catalysts	Signal intensity (arb. Units)				RE (%)
	$\cdot CH_2Cl$	C_2H_3Cl	CO_2	CO	
Quartz	0.614	0.091	0.116	0.059	-
NaW/SiO_2-C	0.356	0.291	0.096	0.064	40
NaW/SiC-C	0.306	0.380	0.033	0.015	51