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Supporting Information

Tandem Catalytic Conversion of 1-Butene and Ethene to Propene over Combined Mesoporous W-FDU-12 and MgO Catalysts

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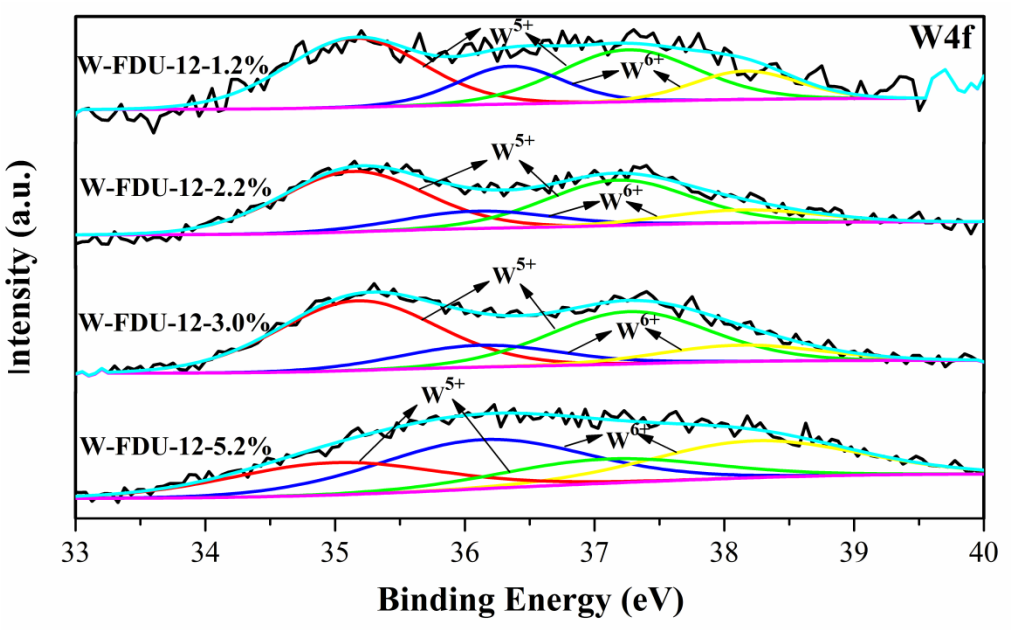

Figure S1 XPS spectra of W-FDU-12 catalysts with various W contents.

Table S1. Binding energies and molar percentages of W^{6+} and W^{5+} species in different catalysts.

Catalysts	Binding energies of W_{4f} (eV)				W^{5+} (%)	W^{6+}(%)
	$W^{6+}4f_{5/2}$	$W^{6+}4f_{7/2}$	$W^{5+}4f_{5/2}$	$W^{5+}4f_{7/2}$		
W-FDU-12-1.2	38.3	36.2	37.2	35.1	70.5	29.5
W-FDU-12-2.2	38.2	36.2	37.3	35.1	77.0	23.0
W-FDU-12-3.0	38.3	36.2	37.2	35.0	75.9	24.1
W-FDU-12-5.2	38.4	36.3	37.2	35.1	40.3	59.7

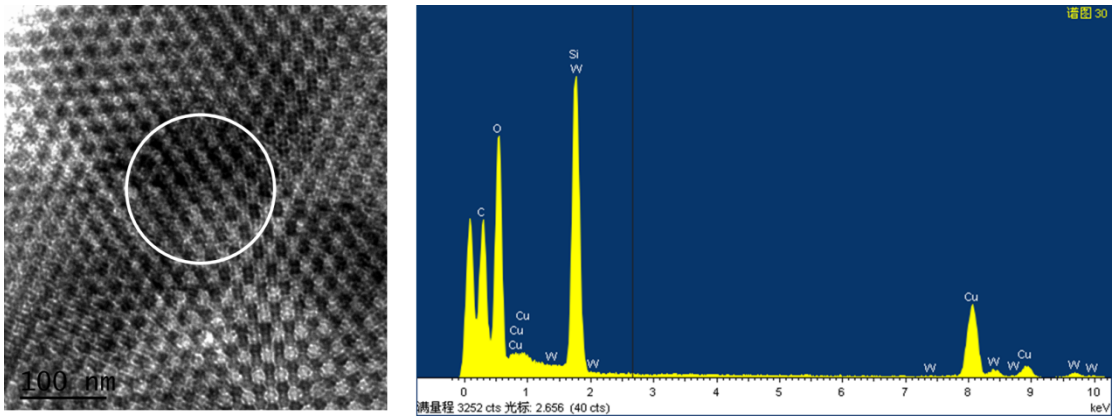

Figure S2 TEM image of W-FDU-12-4.0% (left panel) and corresponding EDX spectra (right panel).

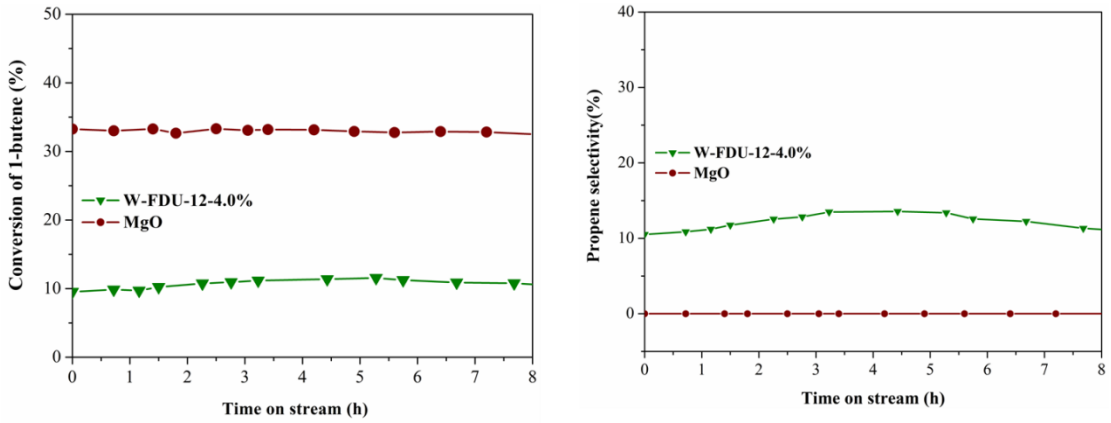

Figure S3 1-butene conversion and propene selectivity over individual MgO or W-FDU-12-4.0% catalyst. Reaction conditions: T=450°C; P=0.1MPa; 1-C_4H_8/C_2H_4=1/2; WHSV (1-C_4H_8+C_2H_4) of 0.9 h^{-1}.

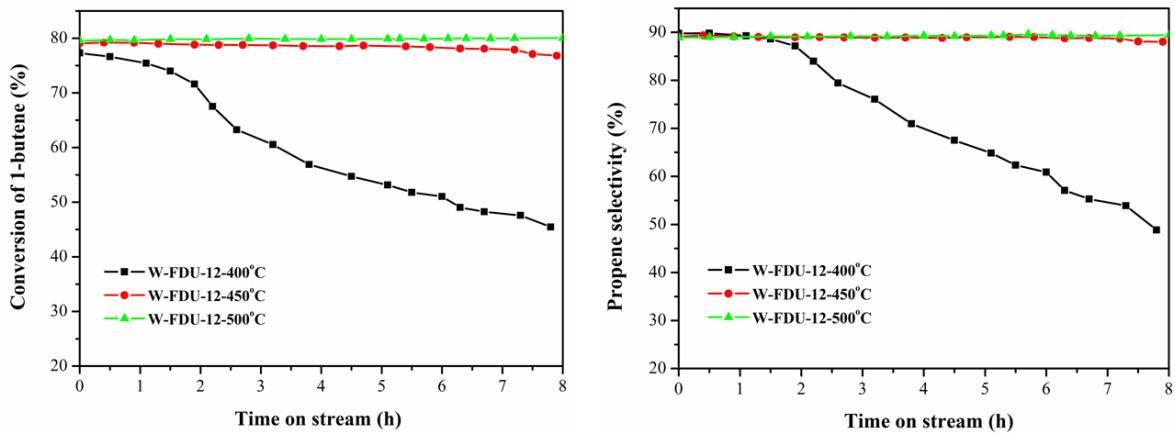

Figure S4. 1-Butene conversion (left panel) and propene selectivity (right panel) over W-FDU-12-4.0% catalysts at different reaction temperatures. Reaction conditions: P=0.1MPa; 1-C_4H_8/C_2H_4=1/2; WHSV (1-C_4H_8+C_2H_4) of 0.9 h^{-1}; W-contained catalyst=1.0 g.

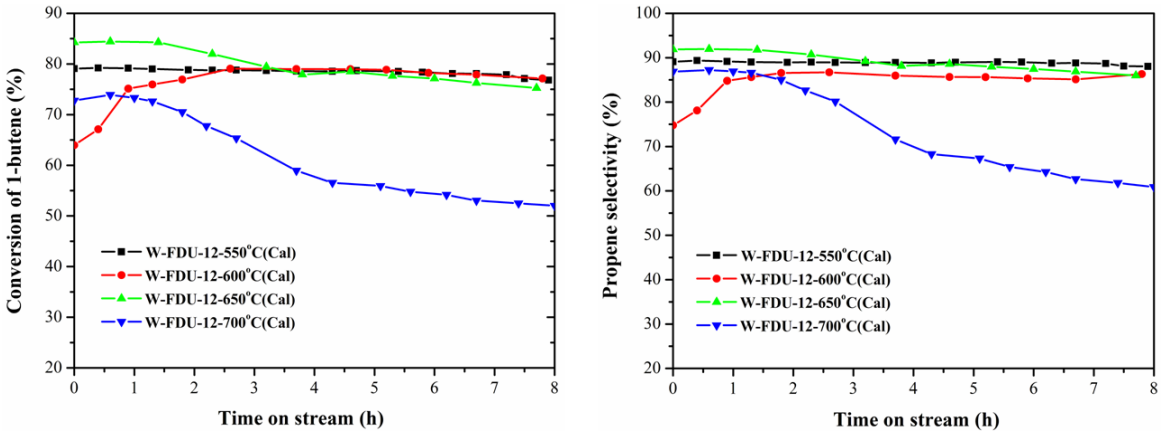

Figure S5. 1-Butene conversion (left panel) and propene selectivity (right panel) over W-FDU-12-4.0% catalysts at different calcinated temperatures. Reaction conditions: T=450 ^{o}C; P=0.1MPa; 1-C_4H_8/C_2H_4=1/2; WHSV (1-C_4H_8+C_2H_4) of 0.9 h^{-1}; W-contained catalyst=1.0 g.

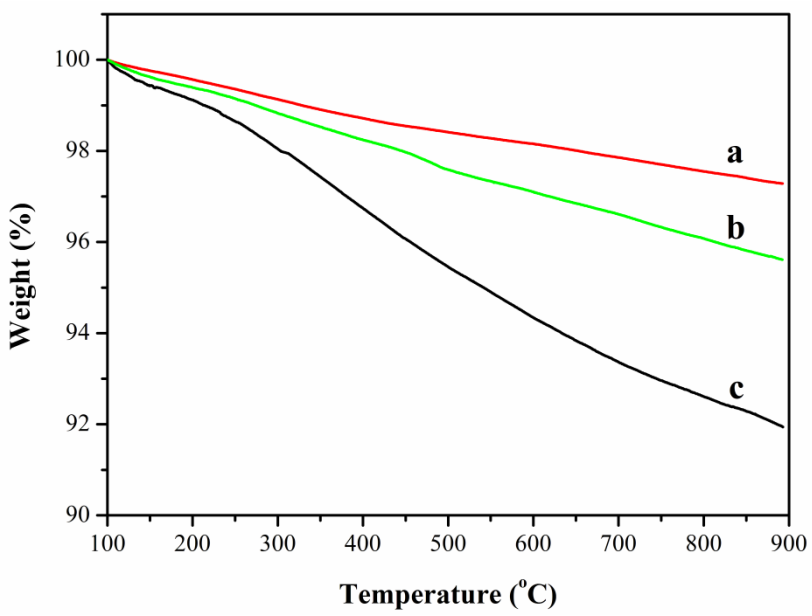

Figure S6. The TG curves of different used catalysts after 8 hours of reaction showing (a) W-FDU-12-4.0%; (b) WO_3/FDU-12-4.0%; and (c) WO_3/SiO_2-4.0%.