

Supplementary Information

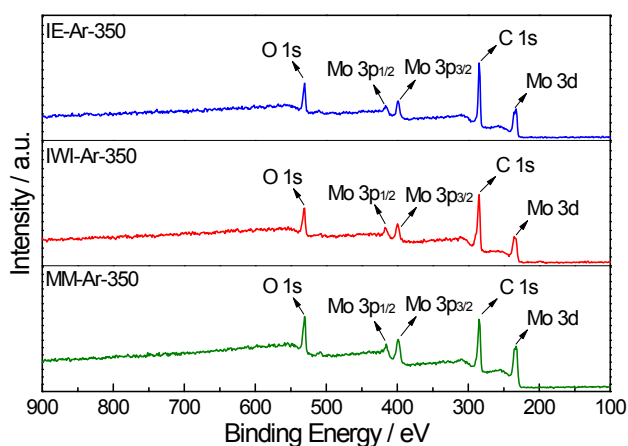


Fig. S1 Full scan width XPS spectra of IE-Ar-350, IWI-Ar-350 and MM-Ar-350 obtained in the study.

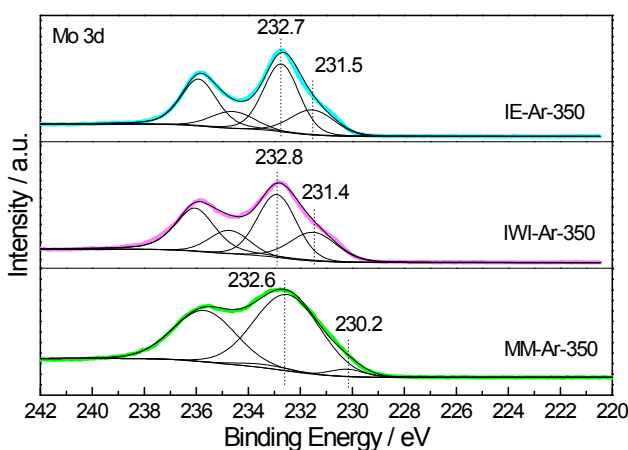


Fig. S2 XPS spectra of IE-Ar-350, IWI-Ar-350 and MM-Ar-350 after Ar^+ etching for 300 s.

Table S1 Mo^{4+} (Mo^{5+}) concentrations on IE-Ar-350, IWI-Ar-350 and MM-Ar-350 surfaces obtained by XPS before and after Ar^+ etching.

Sample	Mo^{4+} (Mo^{5+}) concentration	
	Before etching	After etching
IE-Ar-350	26.8%	30.0%
IWI-Ar-350	29.6%	35.4%
MM-Ar-350	0	5.1%

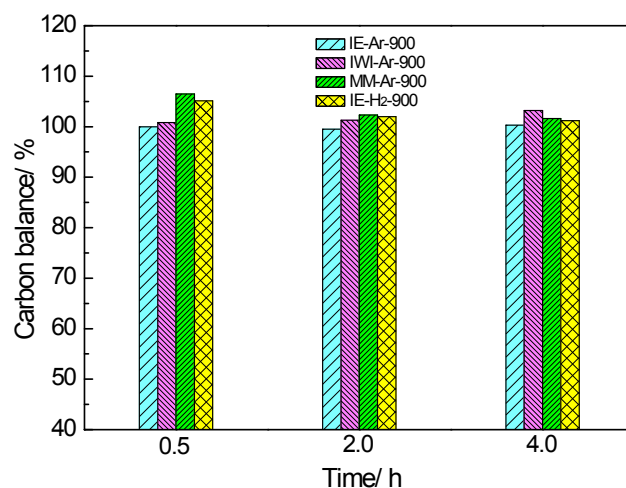


Fig. S3 Carbon balances over various molybdenum carbide catalysts at different times in DRM.

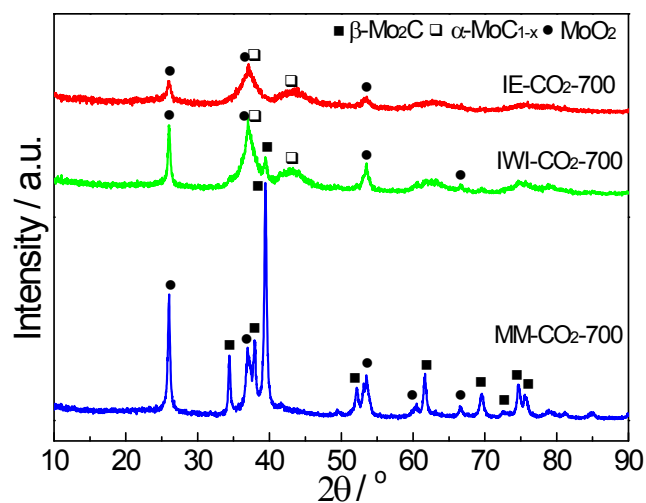


Fig. S4 XRD patterns of the IE-Ar-900, IWI-Ar-900 and MM-Ar-900 samples after exposure to 2%CO₂/Ar at 700 °C for 1 h.

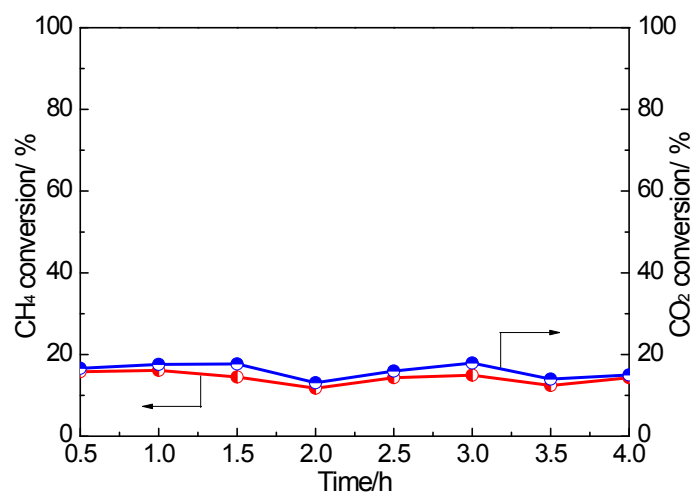


Fig. S5 The catalytic performance of R-Ar-900 for DRM.