Electronic Supplementary Material (ESI) for RSC Advances.

Supporting information

Tailoring the active phase of CoO-based thin-film catalysts in order to tune selectivity in CO_2 hydrogenation

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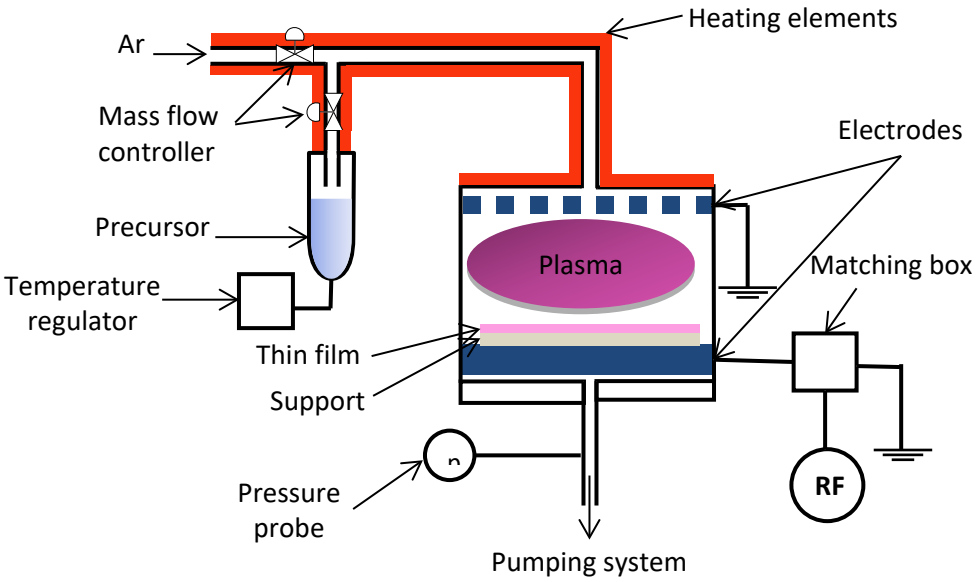


Figure S1. Schematic of PECVD setup for the thin film deposition.

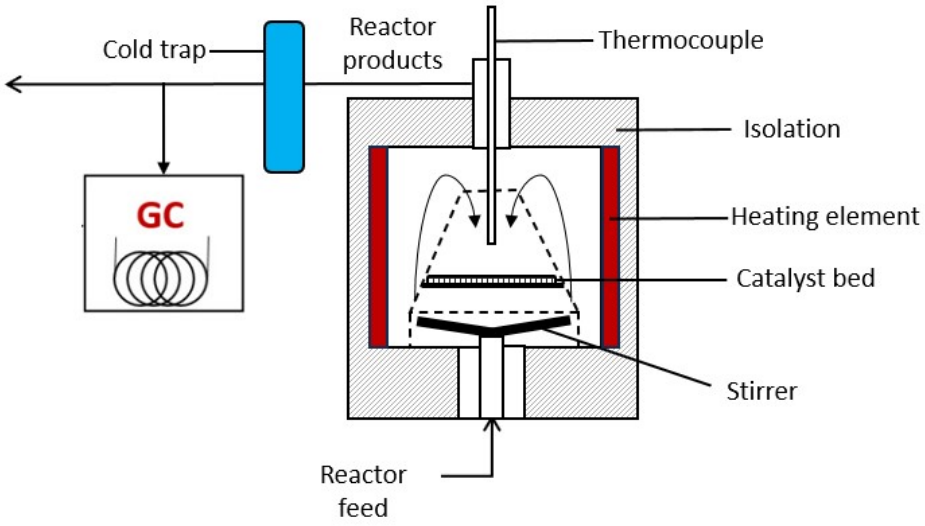


Figure S2. Schematic of CSTR for catalytic test.

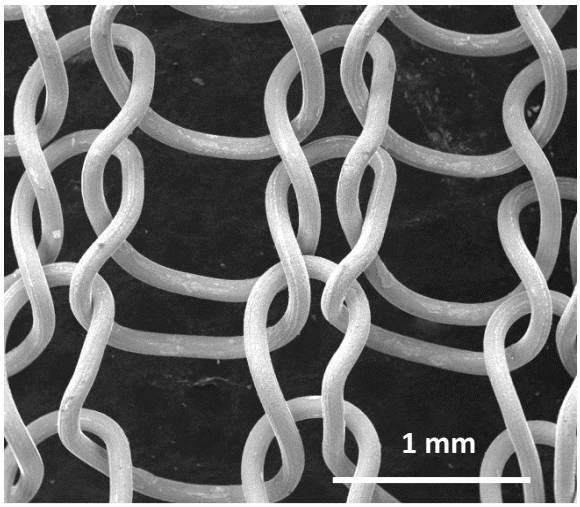
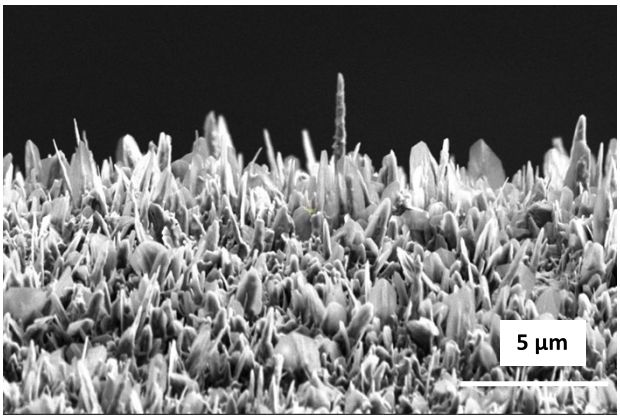


Figure S3. SEM pattern of the wire gauze kanthal steel mesh used as the structured support for a thin-film catalyst.



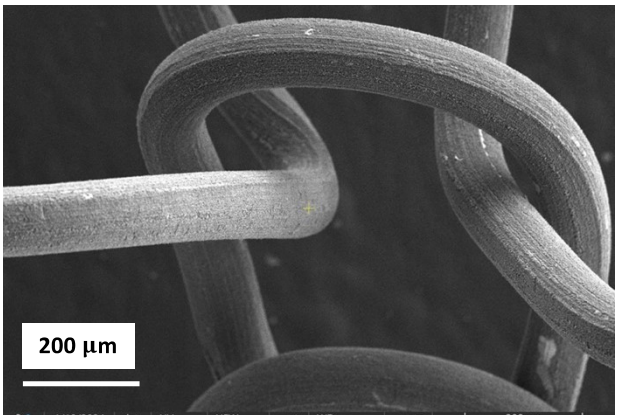


Figure S4. SEM morphology and image of calcined kanthal steel wire gauze meshes.

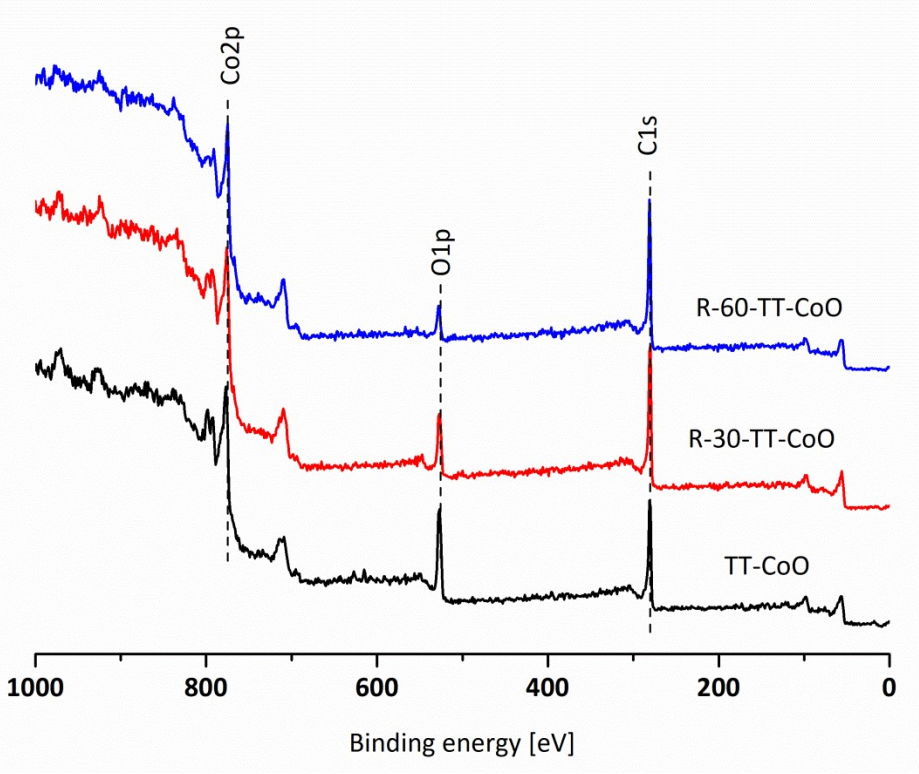


Figure S5. XPS wide spectra of TT-CoO, R-30-CoO, and R-60-TT-CoO thin-film catalysts.

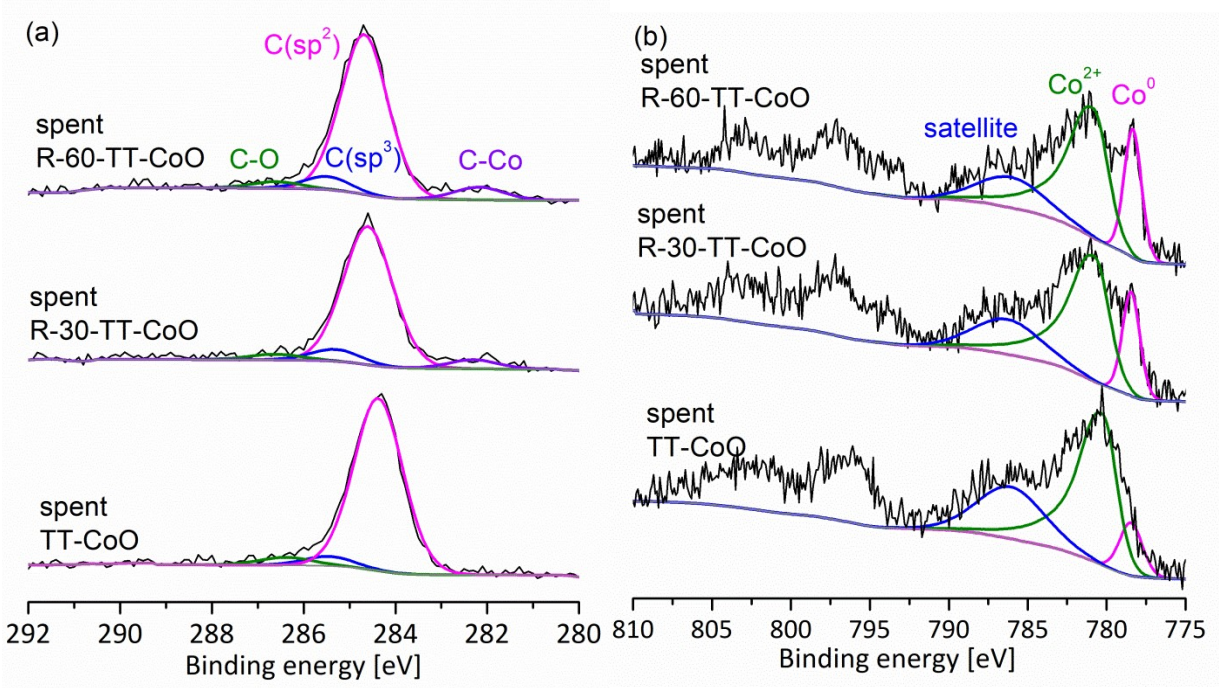


Figure S6. XPS a) C 1s and b) Co 2p of spent TT-CoO, R-30-TT-CoO and R-60-TT-CoO.

Table S1. The CoO/Co^0 ratio on the surface for fresh and spent catalysts.

Thin film	**CoO/Co^0**	
	fresh	spent
TT-CoO	10.2 ± 0.9	10.0 ± 0.2
R-30-TT-CoO	3.1 ± 0.4	4.5 ± 0.4
R-60-TT-CoO	1.1 ± 0.1	3.8 ± 0.3

The spent series are referred to as catalytic films after applying in CO_2 methanation reaction in the temperature range of 250-400 °C. It is observed that the TT-CoO catalyst exhibits excellent stability during the CO_2 methanation reaction. However, the pre-reduced catalysts become partially oxidized in the reaction mixture, as evidenced by the increase in the CoO/Co^0 ratio after the reaction compared to the fresh samples (Table S1).