Figure 1: a) XDR patterns of: **a)** the prepared supports; **b)** XRD patterns of gold based catalysts; **c)** XRD patterns of platinum based catalysts

Figure 2: UV-Vis spectra of the prepared solids: **a)** supports**; b)** noble metal based catalysts.

Figure 3: Raman spectra of CeAl and CeFeAl support**.**

Figure 4: HAADF-STEM images: **a)** Au/CeFeAl; **b)** Pt/CeFeAl.

Figure 5: Comparison between the catalytic activities: **a)** prepared solids under ideal mixture (4.5% CO, 30%H_2O balanced in N_2); **b)** Platinum and gold supported on CeFeAl under realistic conditions (9% CO, 30%H_2O, 12%CO_2 and 50%H_2)

Table 1. Experimental conditions of the catalytic tests

	Model	Realistic
CO (vol%)	4.5	9
H_2O (kPa)	31.1	31.1
CO_2 (vol%)	---	11
H_2 (vol%)	---	50
N_2 (vol%)	Balance	---
Bed volume (cm^3)	1.5	1.5
GHSV (h^{-1})	4000	4000

Table 2: Textural properties of the prepared materials

Sample	**S_{BET} (m^2/g)**	**V_{Pore} (cm^3/g)**	**D_{pore} (Å)**
Al_2O_3	202	0.49	74
CeAl	186	0.42	69
CeFeAl	175	0.39	68
Pt/Al	192	0.49	70
Au/Al	219	0.56	75
Pt/CeAl	156	0.38	76
Au/CeAl	197	0.45	69
Pt/CeFeAl	170	0.39	69
Au/CeFeAl	184	0.42	69

Table 3: Chemical composition of the prepared materials

Sample	**Al_2O_3 (wt.%)**	**CeO_2 (wt.%)**	**Fe_2O_3 (wt.%)**	**Au (wt.%)**	**Pt (wt.%)**
Al_2O_3	100	-	-	-	-
CeAl	84.66	14.62	-	-	-
CeFeAl	81.70	15.44	2.08	-	-
Pt/Al	98.24	-	-	-	1.64
Au/Al	98.80	-	-	1.16	-
Pt/CeAl	77.97	18.78	-	-	2.15
Au/CeAl	82.69	14.7	-	1.68	-
Pt/CeFeAl	83.74	12.20	1.32	-	2.13
Au/CeFeAl	81.20	14.9	1.72	2.17	-

Table 4: Direct and indirect ceria band gap

Sample	Direct band gap (eV)	Indirect band gap (eV)
CeO_2 (single crystal)*	3.62	3.02
CeAl	3.05	2.80
CeFeAl	2.93	2.45
Pt/CeAl	2.94	2.12
Au/CeAl	2.97	2.90
Pt/CeFeAl	2.79	2.26
Au/CeFeAl	2.11	1.50

*taken from references [29,30]

Table 5: WGS specific reaction rates ($molCO_{conv}g^{\cdot}metal^{-1\cdot}s^{-1}$) and turnover frequencies (s^{-1}) of the prepared solids

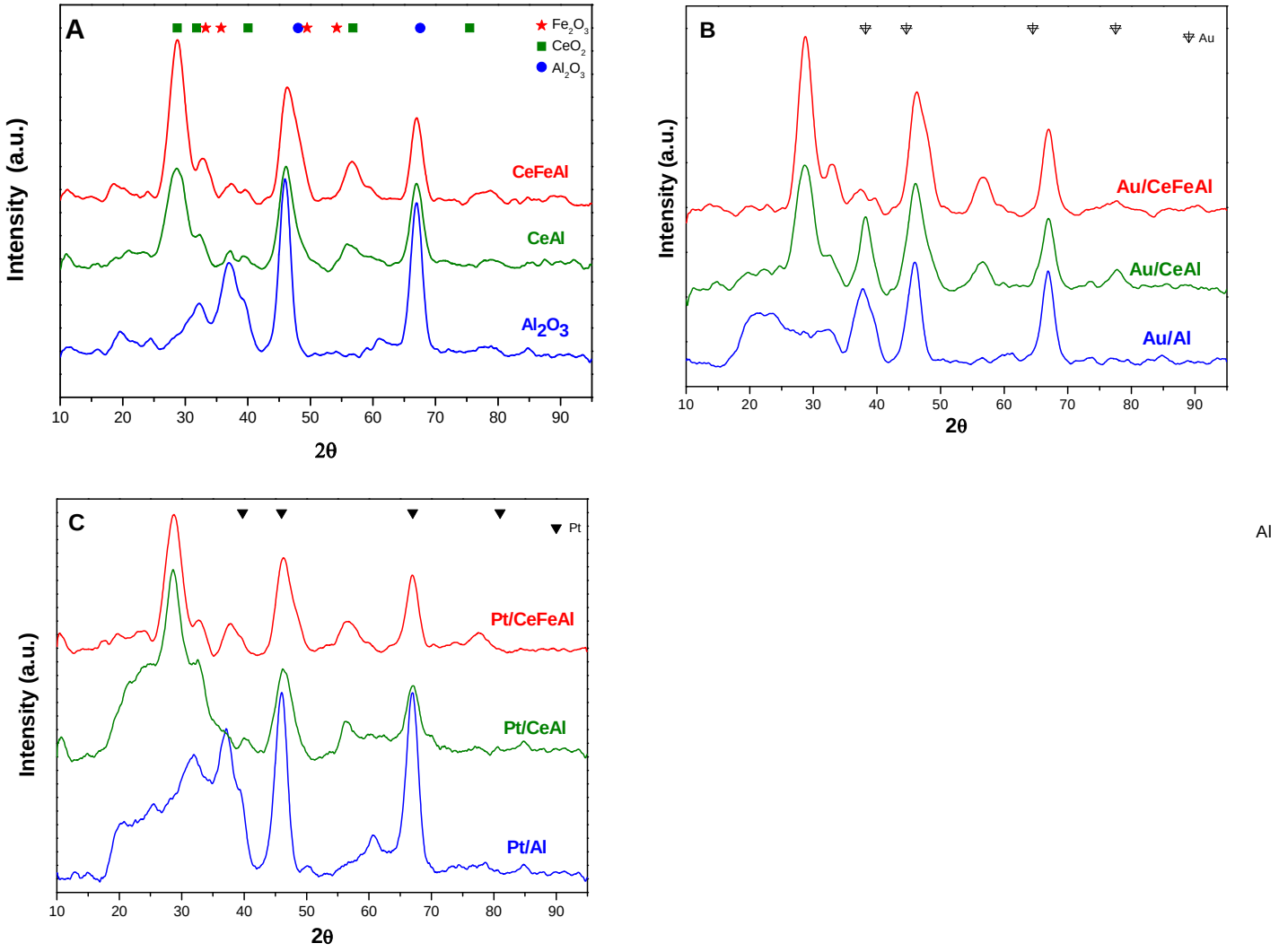
Sample	$Rate_{180^oC}$ $x\ 10^5$	$Rate_{250^oC}$ $x10^5$
Pt/Al	0.61	8.95
Au/Al	2.07	2.25
Pt/CeAl	2.92	15.54
Au/CeAl	4.91	9.34
Pt/CeFeAl	4.71	15.69
Au/CeFeAl	8.94	13.26
Au/CeM[36]	4.6	
Au/Ce[37]	3.2	
Pt/Ce[38]		0.18

Table 6: Turnover frequencies (s^{-1}) of the Pt/CeFeAl and Au/CeFeAl

	TOF_{180^oC} $x10^2$	$TOF^*_{180^oC}$ $x10^2$	TOF_{250^oC} $x10^2$	$TOF^*_{250^oC}$ $x10^2$
Pt/CeFeAl	1.31(3.29)	0.49(1.14)	4.37(10.9)	4.8 (11.2)
Au/CeFeAl	5.33	1.71	7.92	5.18

*Values corresponding to the realistic conditions out of the parenthesis.
Values corresponding to postreaction catalysts inside in parenthesis.

Figure 1



Al

Figure 2

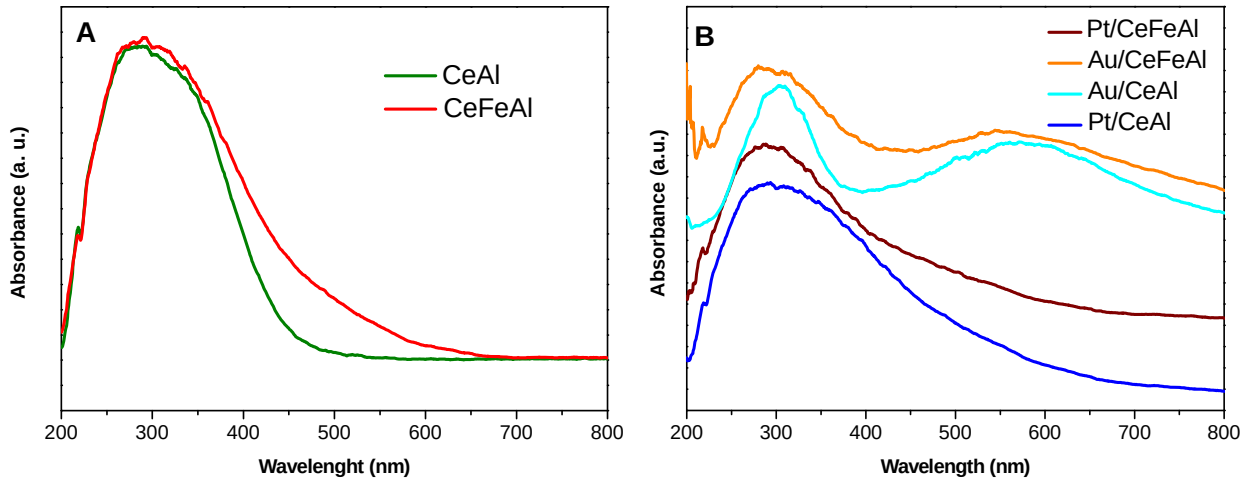


Figure 3

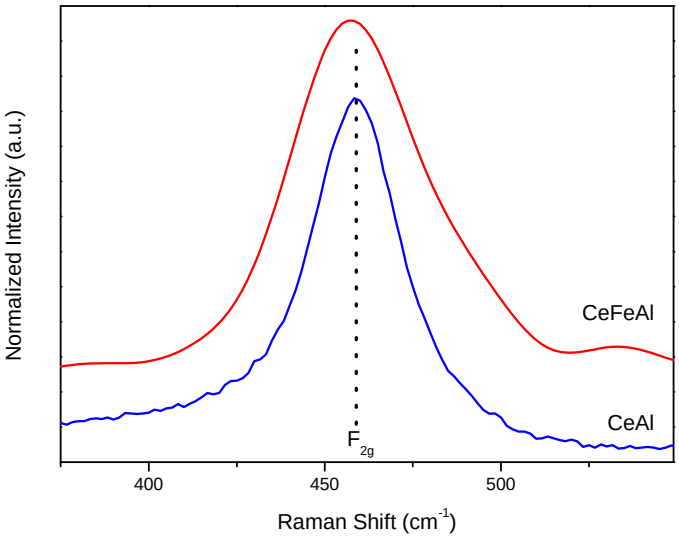
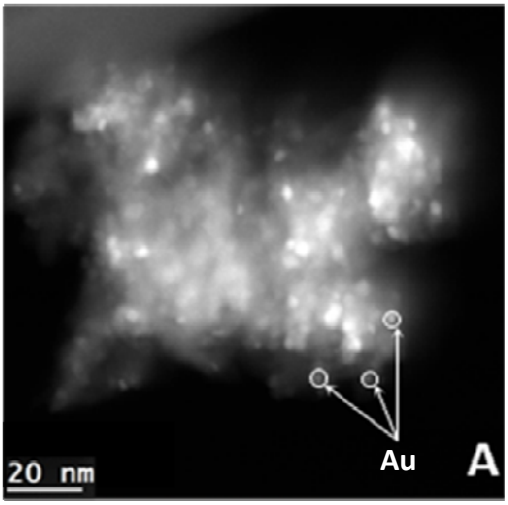


Figure 4



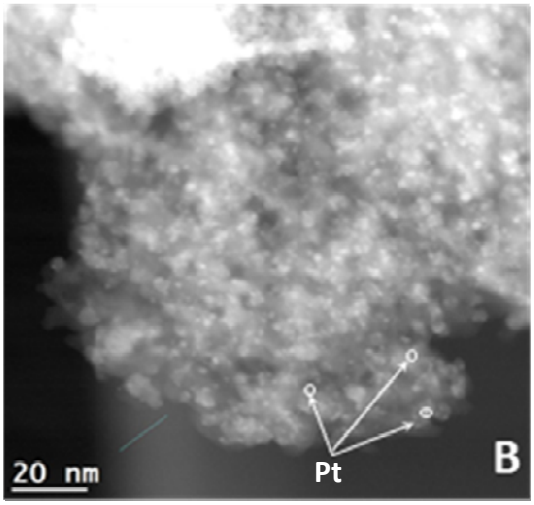
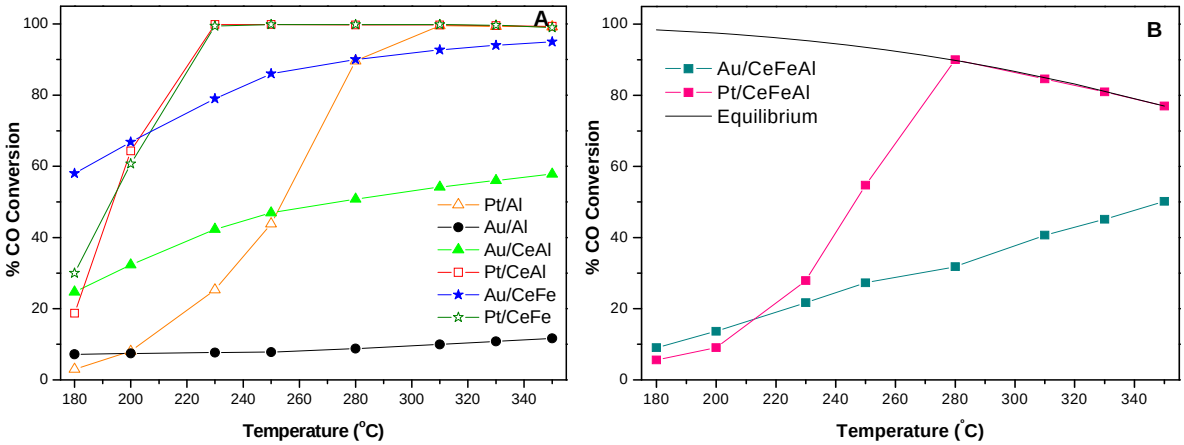


Figure 5


A
% CO Conversion
Temperature (°C)
Pt/Al
Au/Al
Au/CeAl
Pt/CeAl
Au/CeFe
Pt/CeFe
B
% CO Conversion
Temperature (°C)
Au/CeFeAl
Pt/CeFeAl
Equilibrium