

Supporting Information

**Sorption enhanced CO₂ hydrogenation to Formic acid over CuZn-MOF
derived catalyst**

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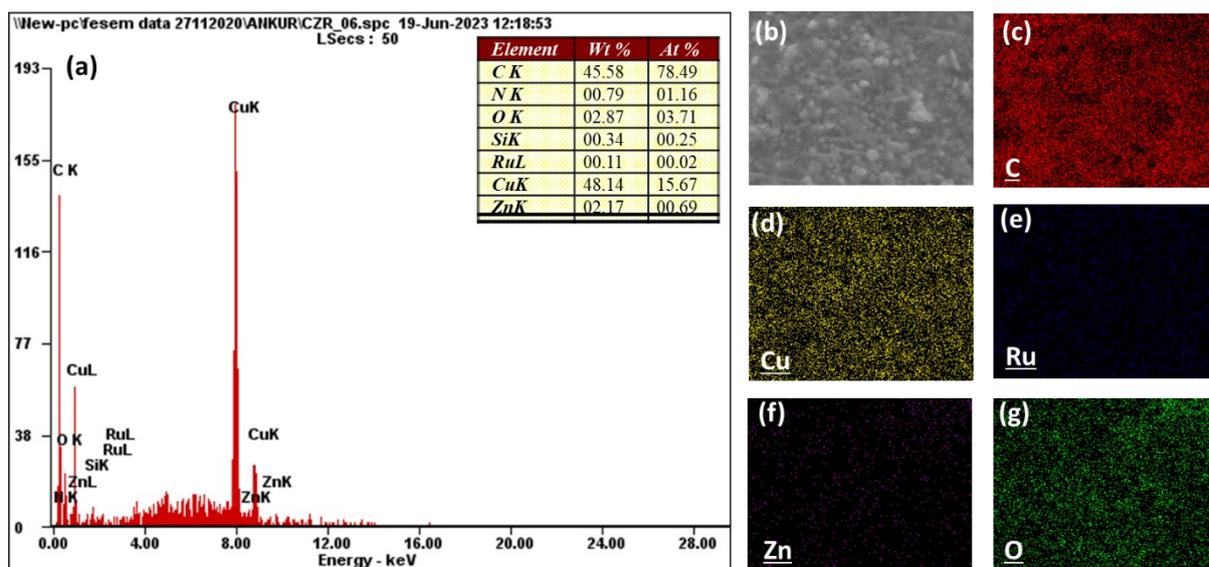


Figure S1: (a) SEM-EDX of Ru-CZ and elemental composition (inset) (b-g) Elemental mapping of Ru-CZ

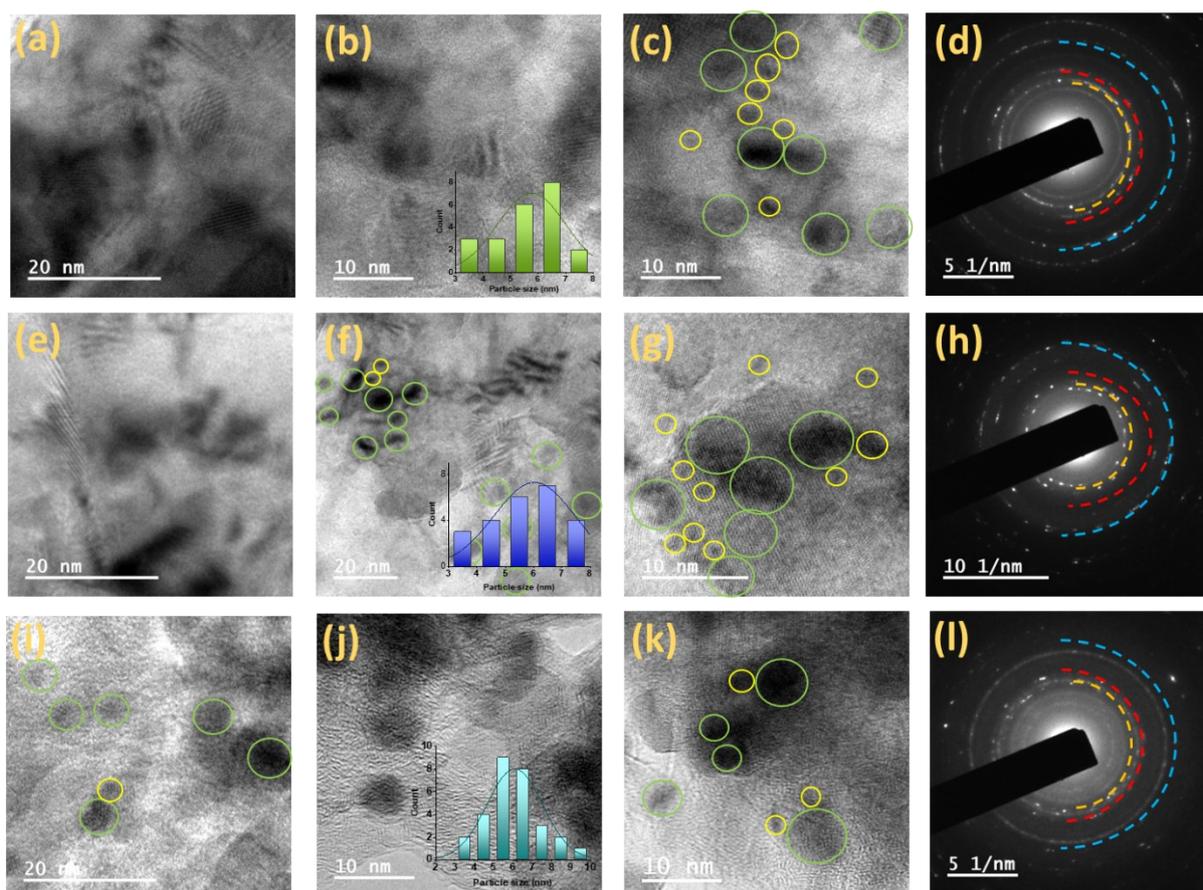


Figure S2: (a-c) HR-TEM image of Pd-CZ, Cu particle size distribution (inset(b)) (d) SAED image of Pd-CZ; (e-g) HR-TEM image of Pt-CZ, Cu particle size distribution (inset(f)) (h) SAED image of Pt-CZ; (i-k) HR-TEM image of Ir-CZ, Cu particle size distribution (inset(j)) (l) SAED image of Ir-CZ

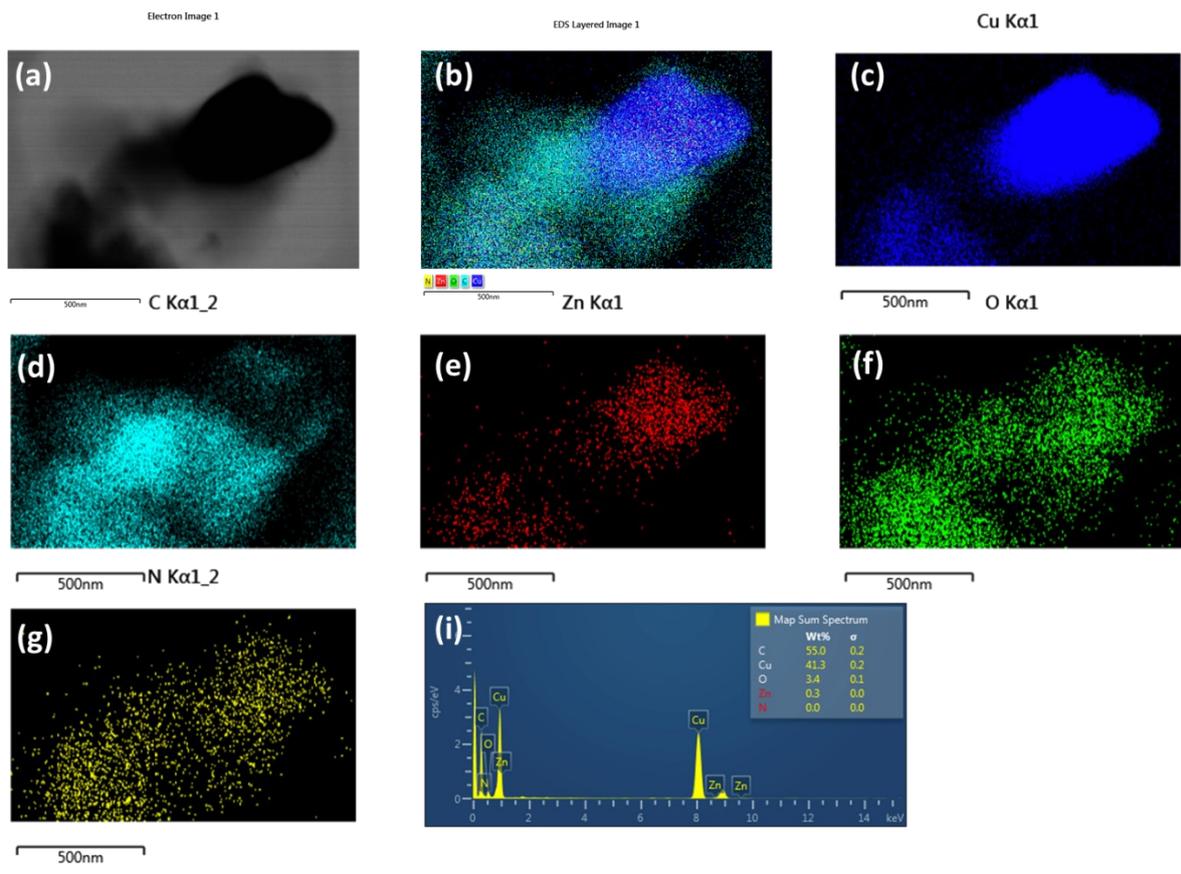


Figure S3: (a-g) Elemental mapping of CZ (h) TEM-EDX of CZ

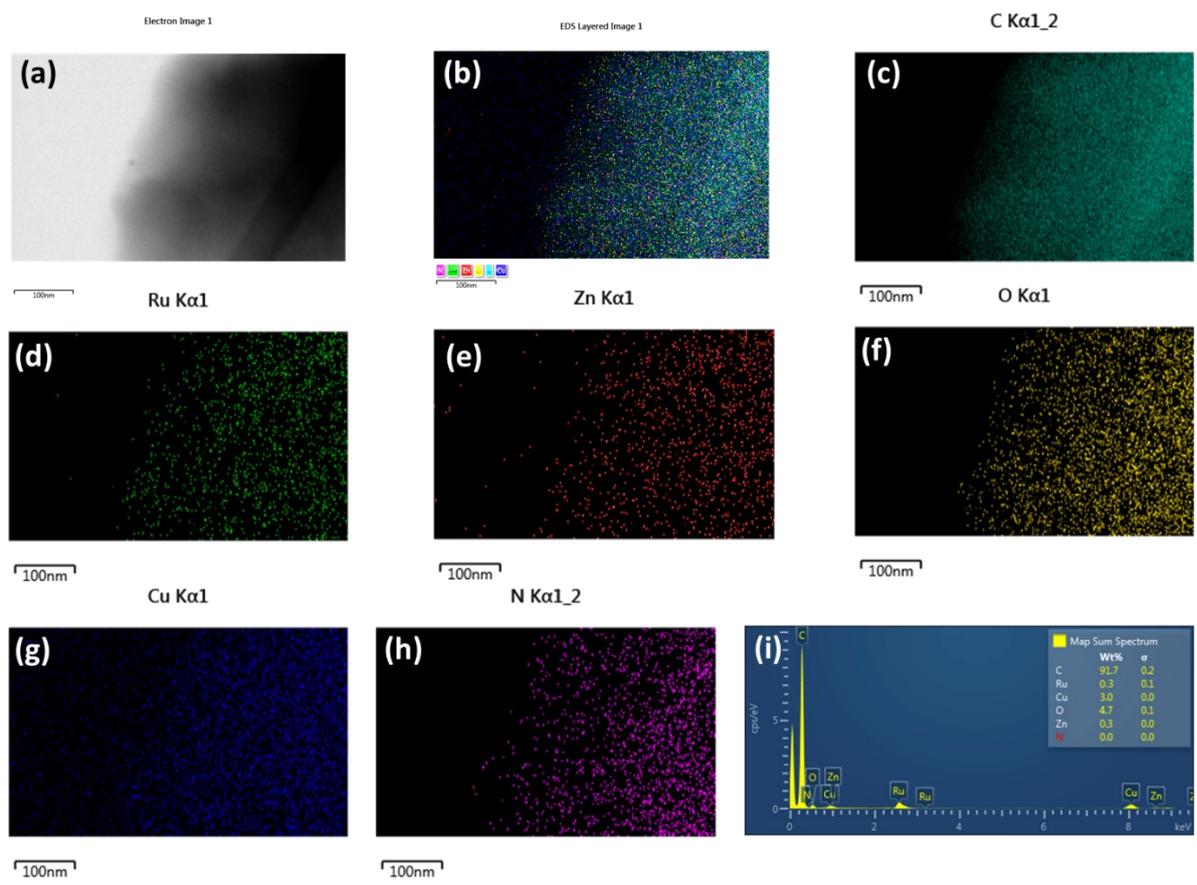


Figure S4: (a-h) Elemental mapping of Ru-CZ (i) TEM-EDX of Ru-CZ

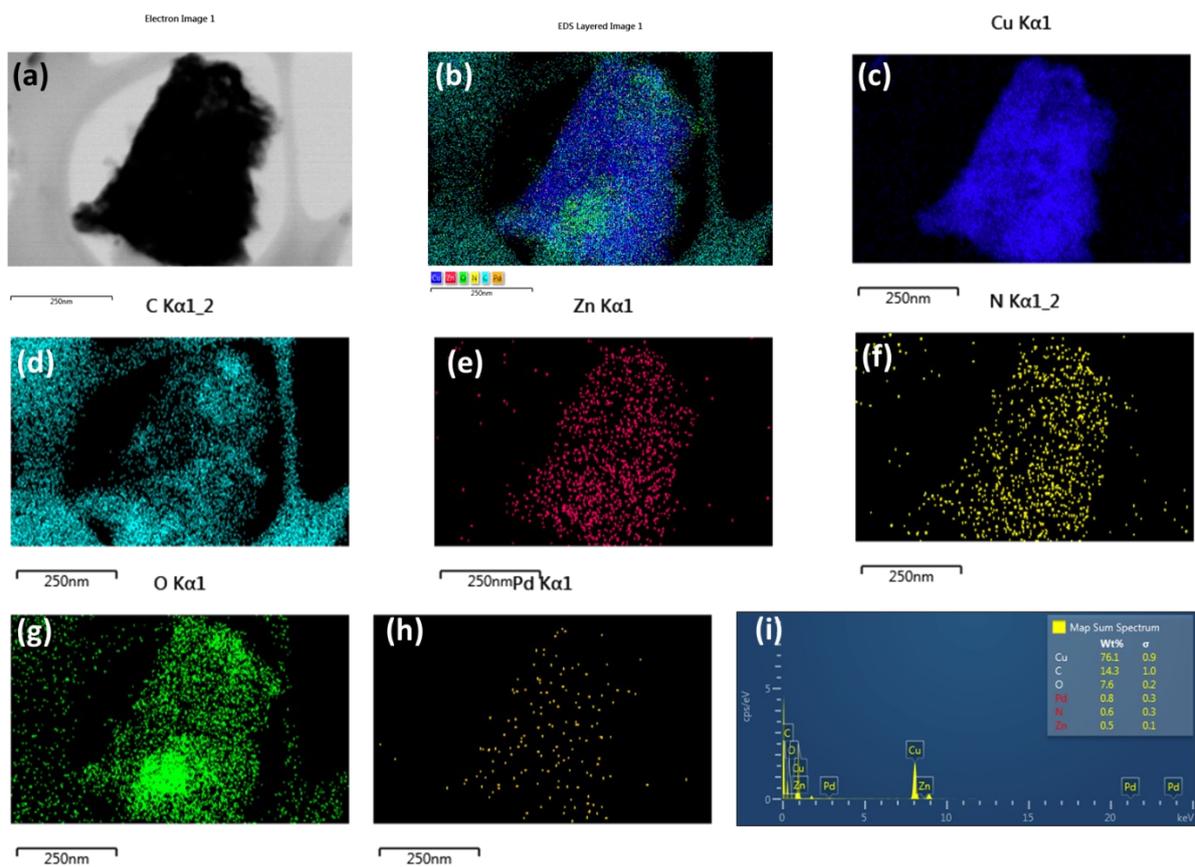


Figure S5: (a-h) Elemental mapping of Pd-CZ (i) TEM-EDX of Pd-CZ

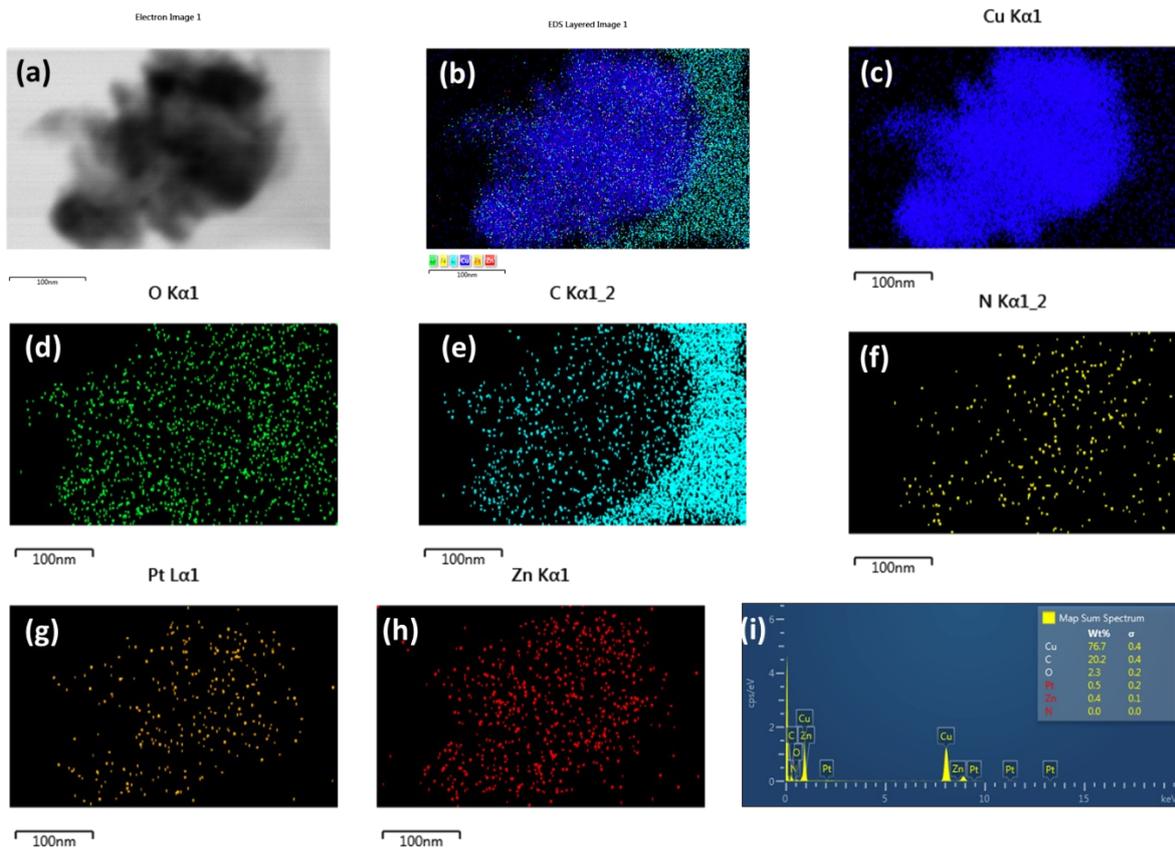


Figure S6: (a-h) Elemental mapping of Pt-CZ (i) TEM-EDX of Pt-CZ

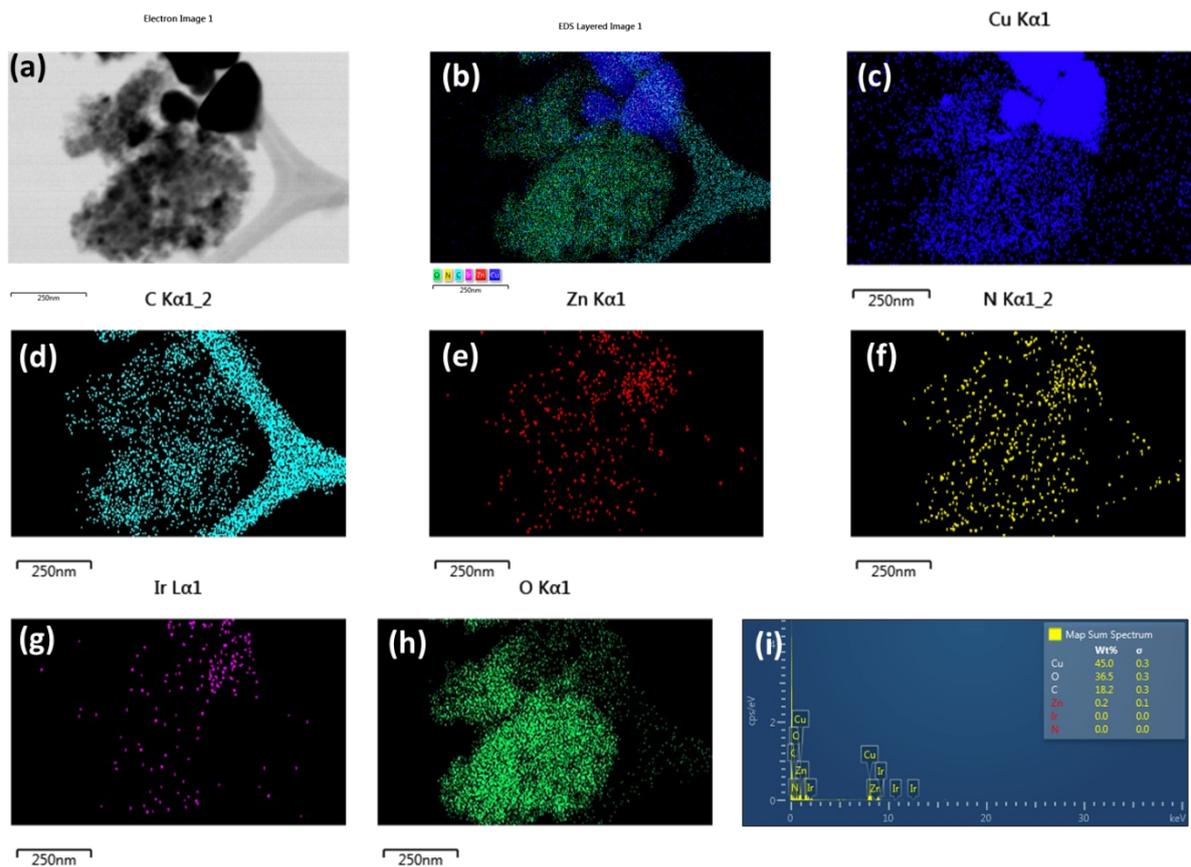
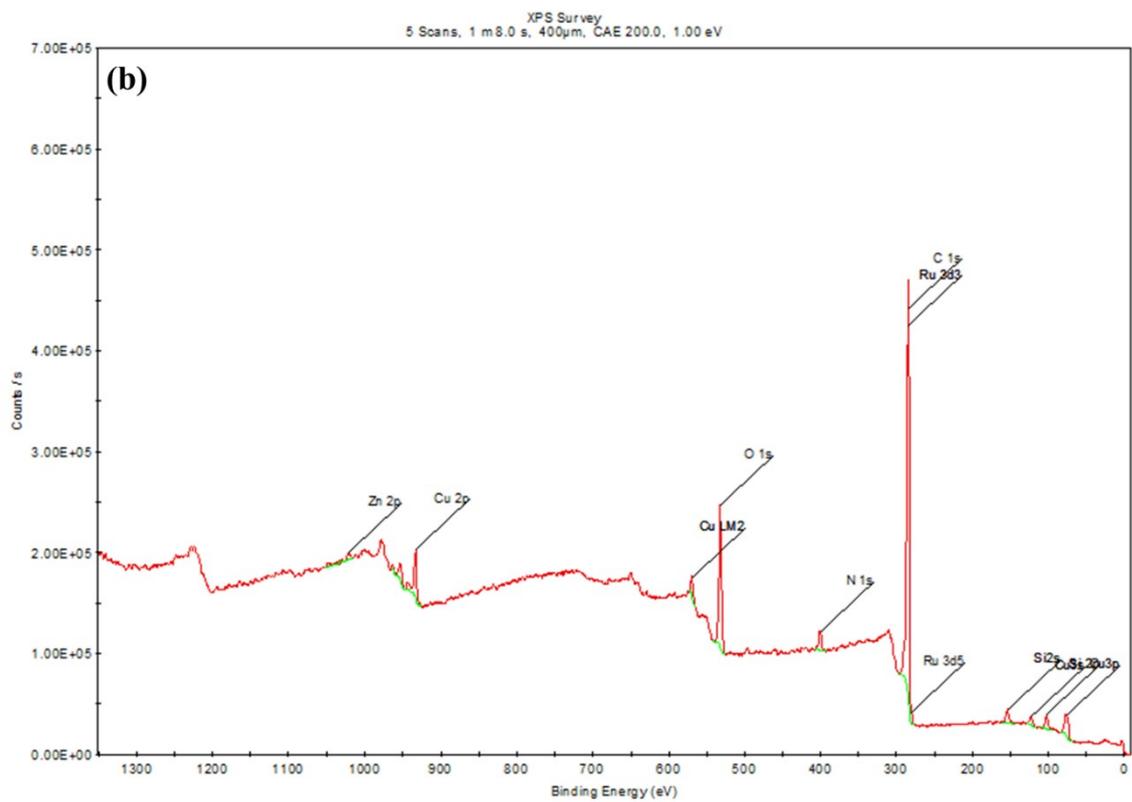
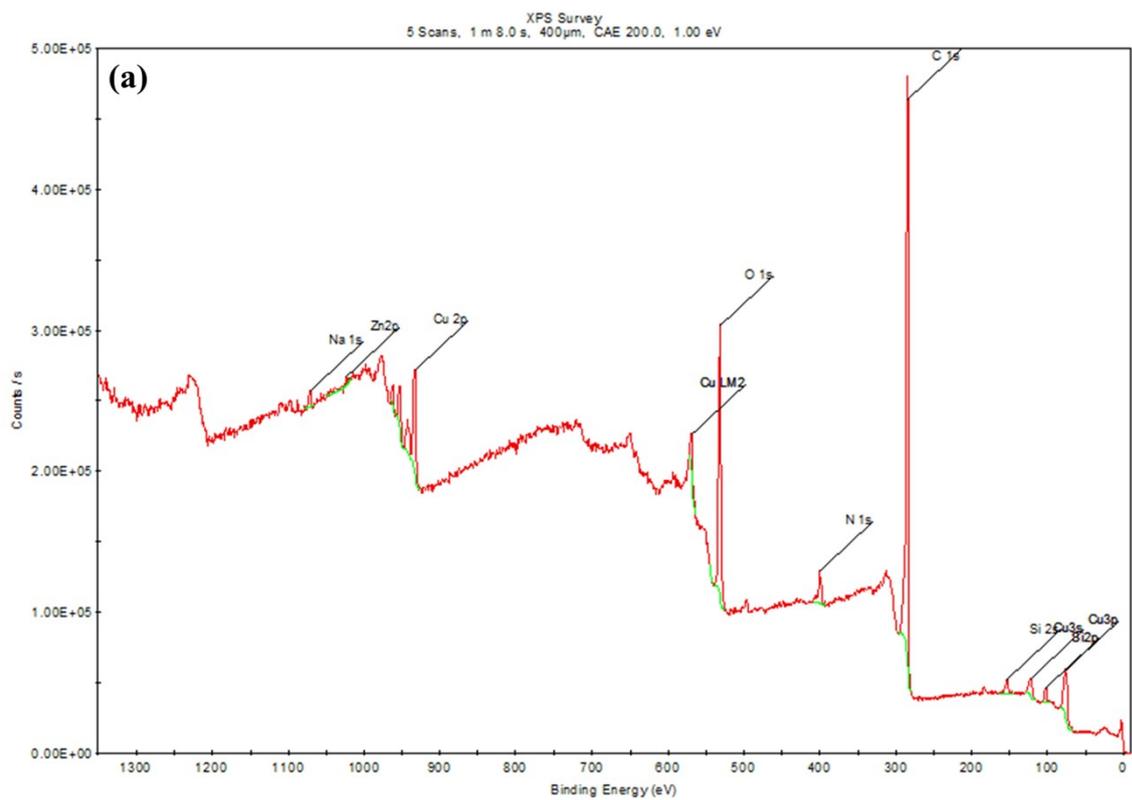
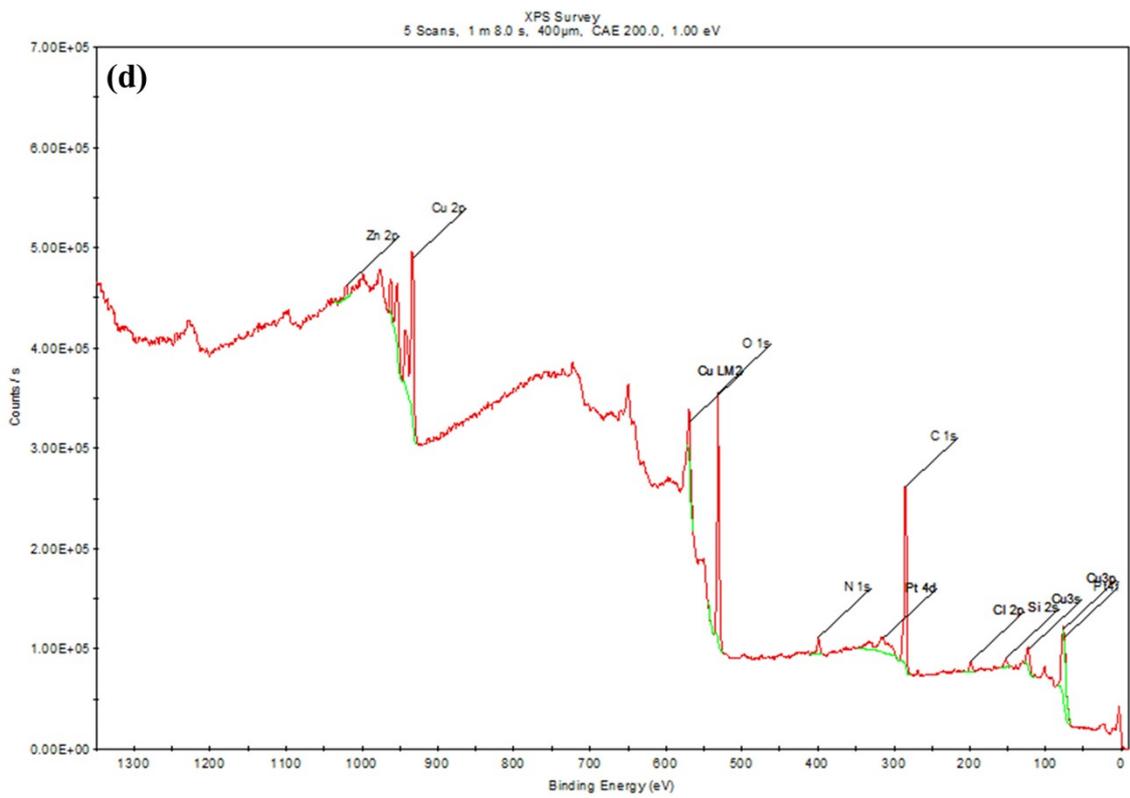
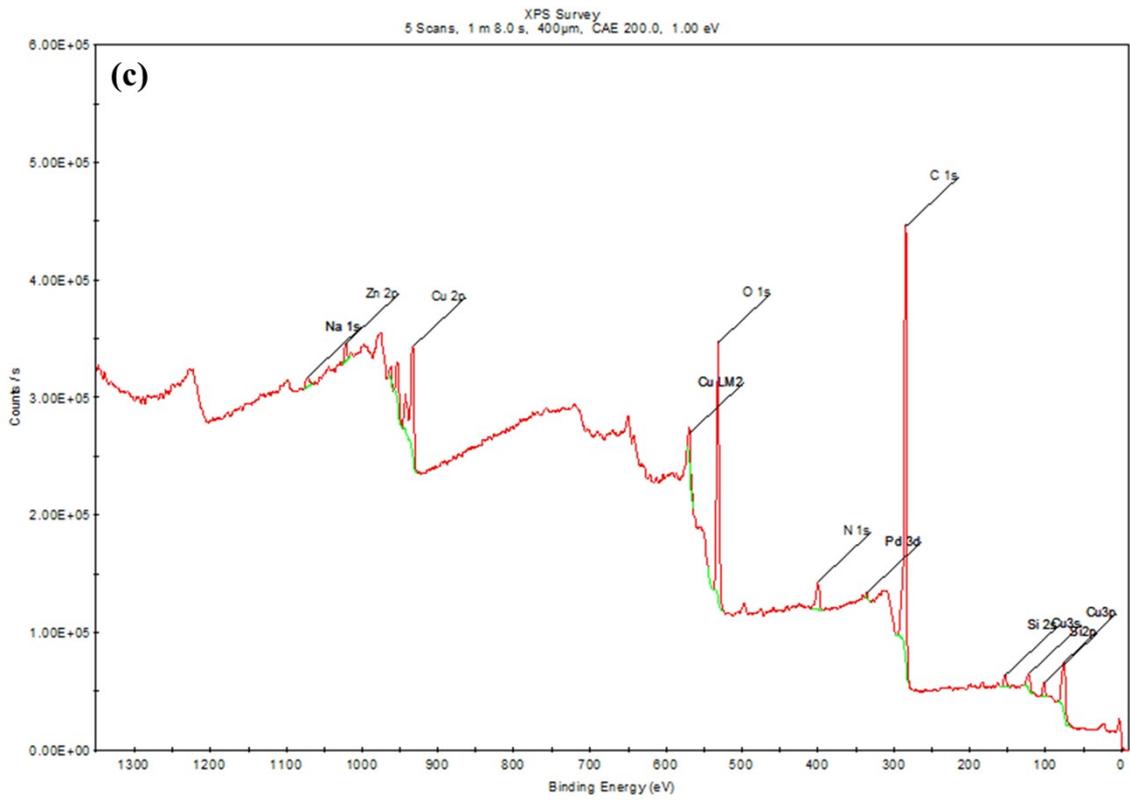


Figure S7: (a-h) Elemental mapping of Ir-CZ (i) TEM-EDX of Ir-CZ





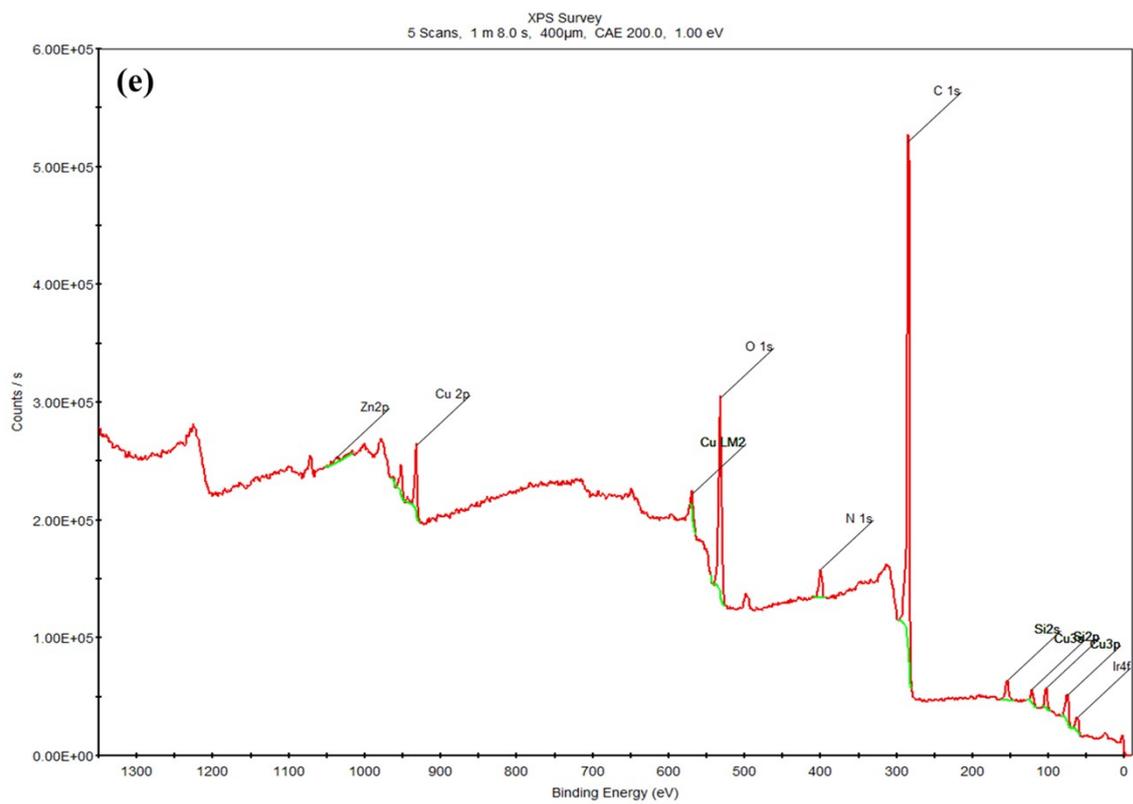


Figure S8: XPS surface spectrum of (a) CZ (b) Ru-CZ (c) Pd-CZ (d) Pt-CZ (e) Ir-CZ

Table S1: The amount of CO₂ desorbed in the CO₂-TPD

Sl. No.	Catalysts	CO ₂ Desorbed (cm ³ /g STP)				Conversion (%)
		Weak	Intermediate	High	Total	
1	CZ	0.1025	0.1547	0.3775	0.6347	5.81
2	Ru-CZ	0.0149	0.0187	1.1575	1.1912	12.91
3	Pd-CZ	0.0122	0.2605	0.5558	0.9453	7.78
4	Pt-CZ	0.1348	0.3118	0.6213	0.9511	8.29
5	Ir-CZ	0.0000	0.1773	0.8167	0.994	9.83

Table S2: ICP-MS analysis of synthesised catalysts

Sl. No.	Catalysts	Actual content of metals (% wt.)		
		Cu	Zn	M
1	CZ	14.02	0.24	
2	Ru-CZ	13.76	0.21	0.03
3	Pd-CZ	13.40	0.23	0.03
4	Pt-CZ	14.32	0.20	0.02
5	Ir-CZ	14.20	0.20	0.03