

Supplementary file

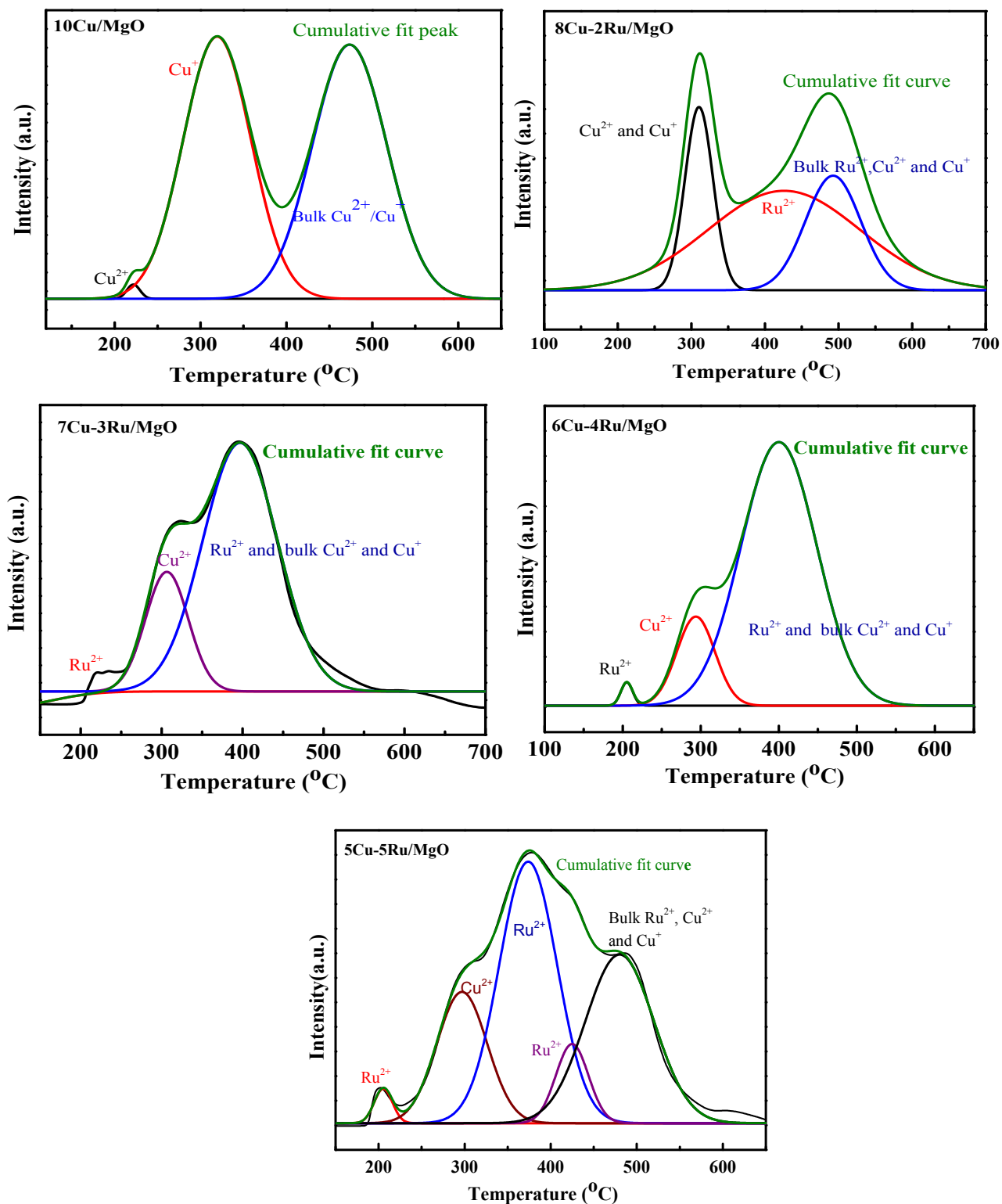


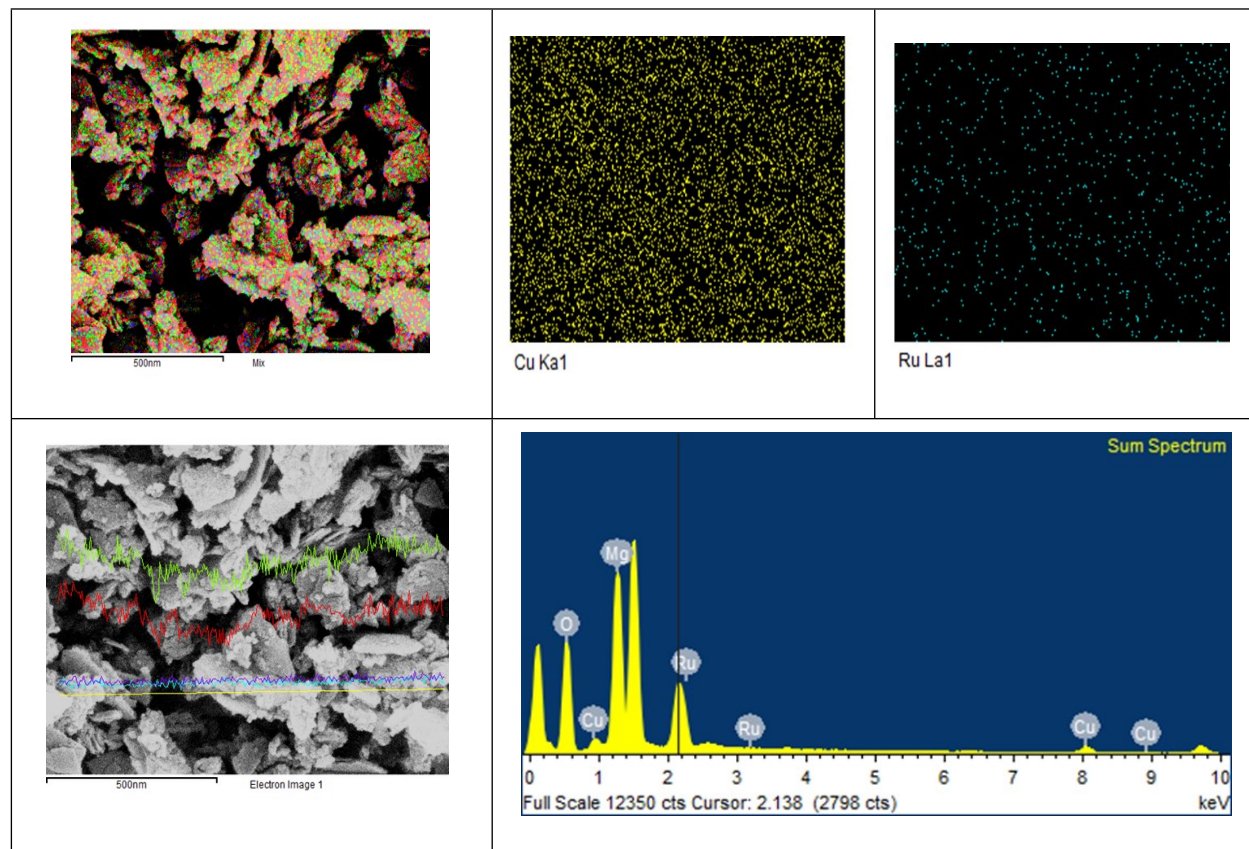
Figure S1. Deconvolution of temperature programmed reduction peaks

Table S1. Reduction temperature of the catalysts

Catalyst	Reduction temperature (°C)
10Cu/MgO	400
8Cu-2Ru/MgO	400
7Cu-3Ru/MgO	350
6Cu-4Ru/MgO	350
5Ru-5Cu/MgO	400

Table S2. Catalyst composition measured from energy dispersive x-ray analysis

Catalyst	Cu (Wt.%)	Ru (Wt.%)
7Cu-3 Ru/MgO	7.1	2.9
6Cu-4Ru/MgO	6.26	3.81
5Ru-5Cu/MgO	5.3	4.1



FigureS2. Elemental mapping and EDX spectrum of reduced 7Cu-3Ru/MgO catalyst

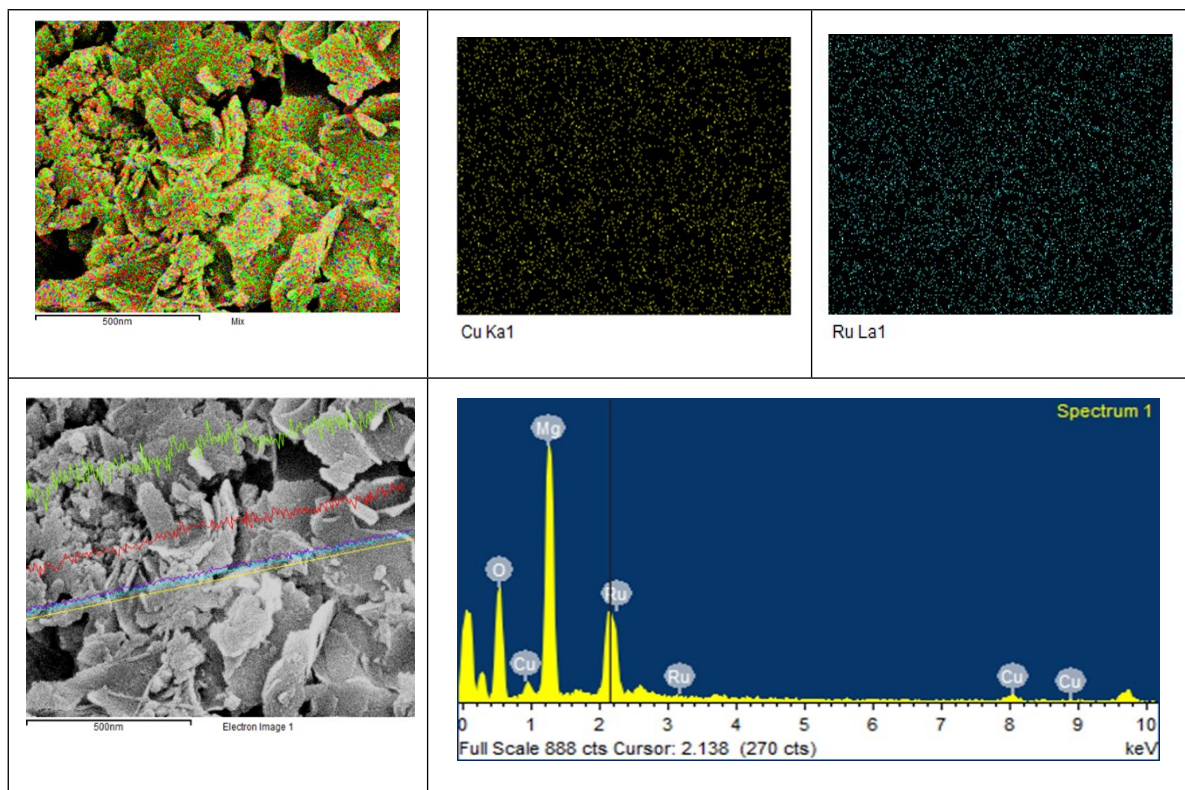


Figure S3. Elemental mapping and EDX spectrum of reduced 6Cu-4Ru /MgO catalyst

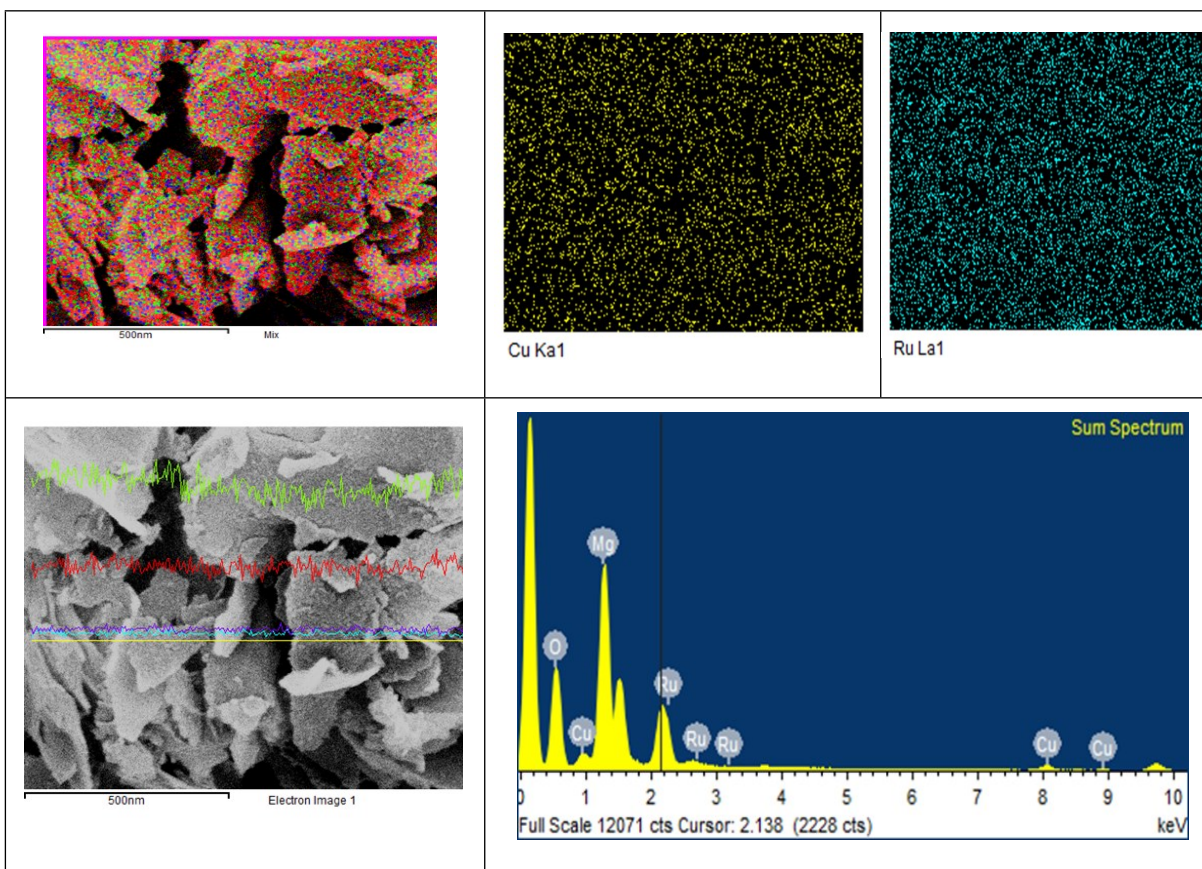


Figure S4. Elemental mapping and EDX spectrum of reduced 5Cu-5Ru /MgO catalyst

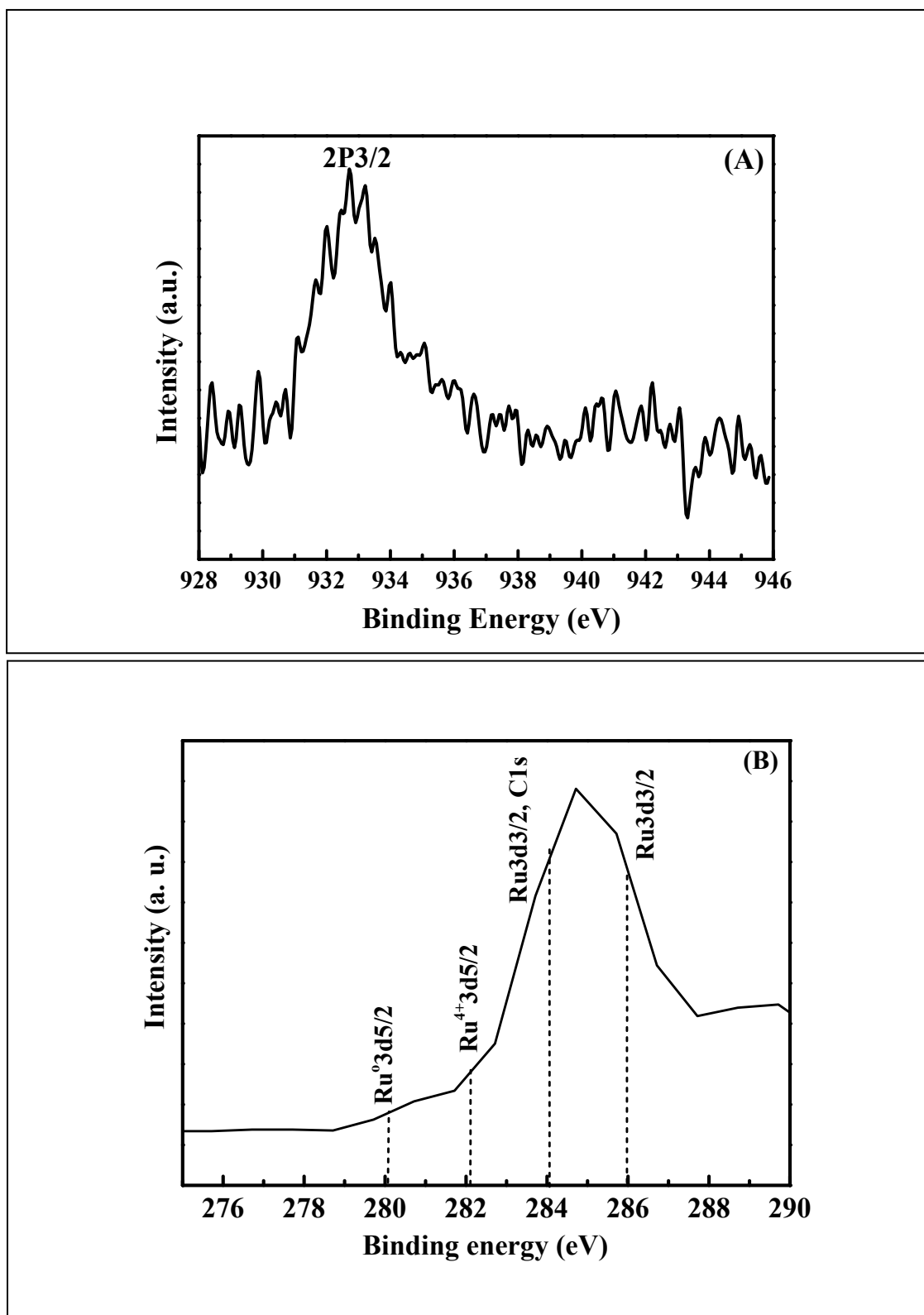


Figure S5. XPS spectrum of fresh reduced 6Cu-4Ru/MgO catalyst, (A) Cu and (B) Ru