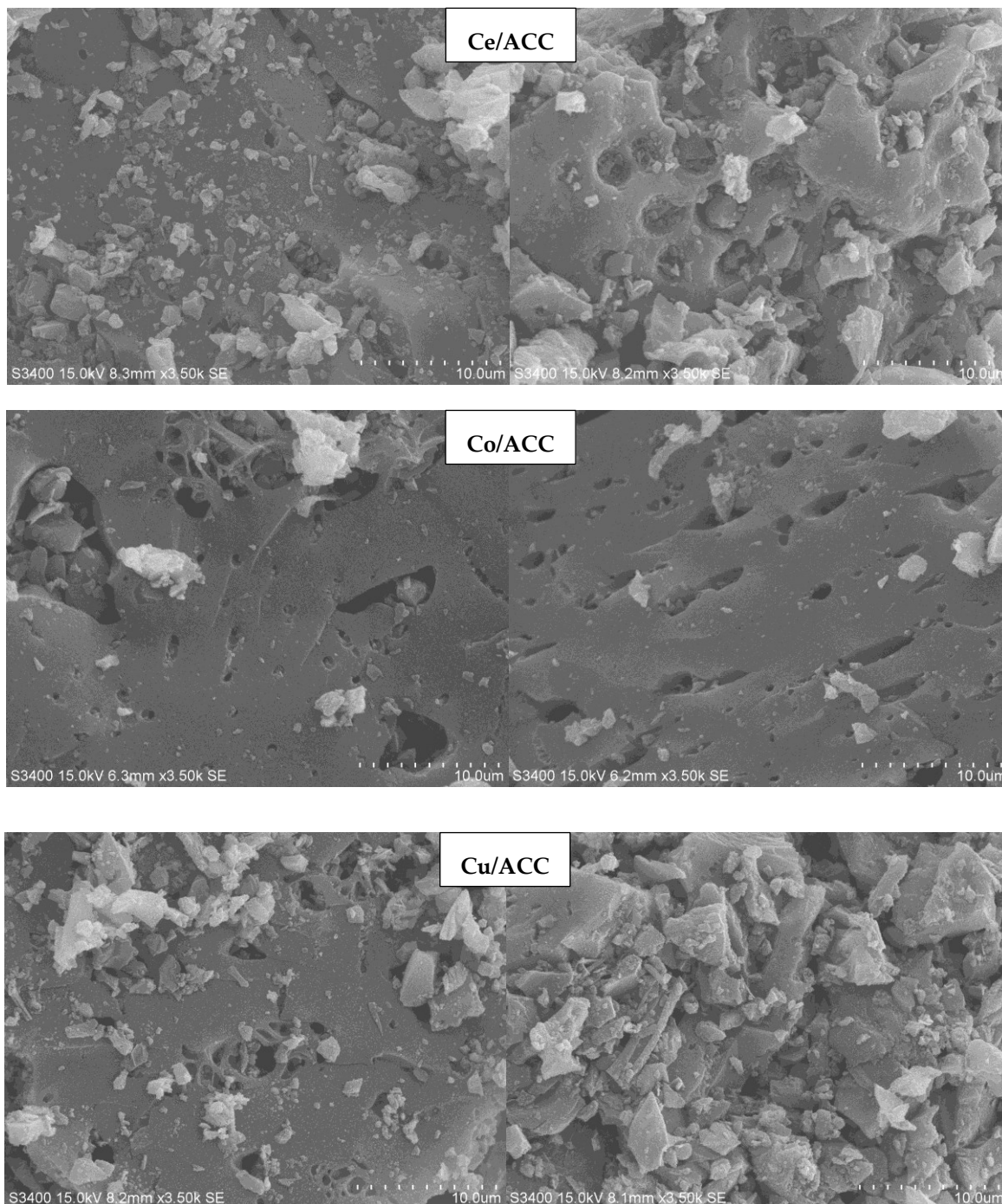


Supporting Materials: Dehydrogenation of ethanol to acetaldehyde over different metals supported on carbon catalysts

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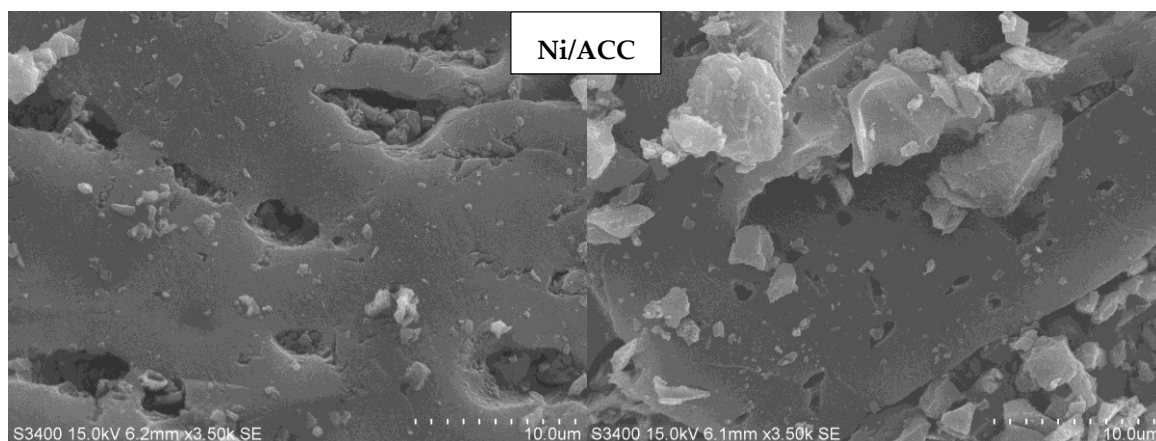


Figure S1. SEM images of activated carbon-supported metal catalysts.

Table S1. %metal content of the different commercial activated carbon catalysts.

Activated carbons	% wt metal ^{*a}	% wt metal ^{*b}
Ce/ACC	28.9	7.37
Co/ACC	26.7	6.73
Cu/ACC	27.4	13.23
Ni/ACC	20.8	7.89

^{*a} by EDX from SEM; ^{*b} by EDX from TEM.

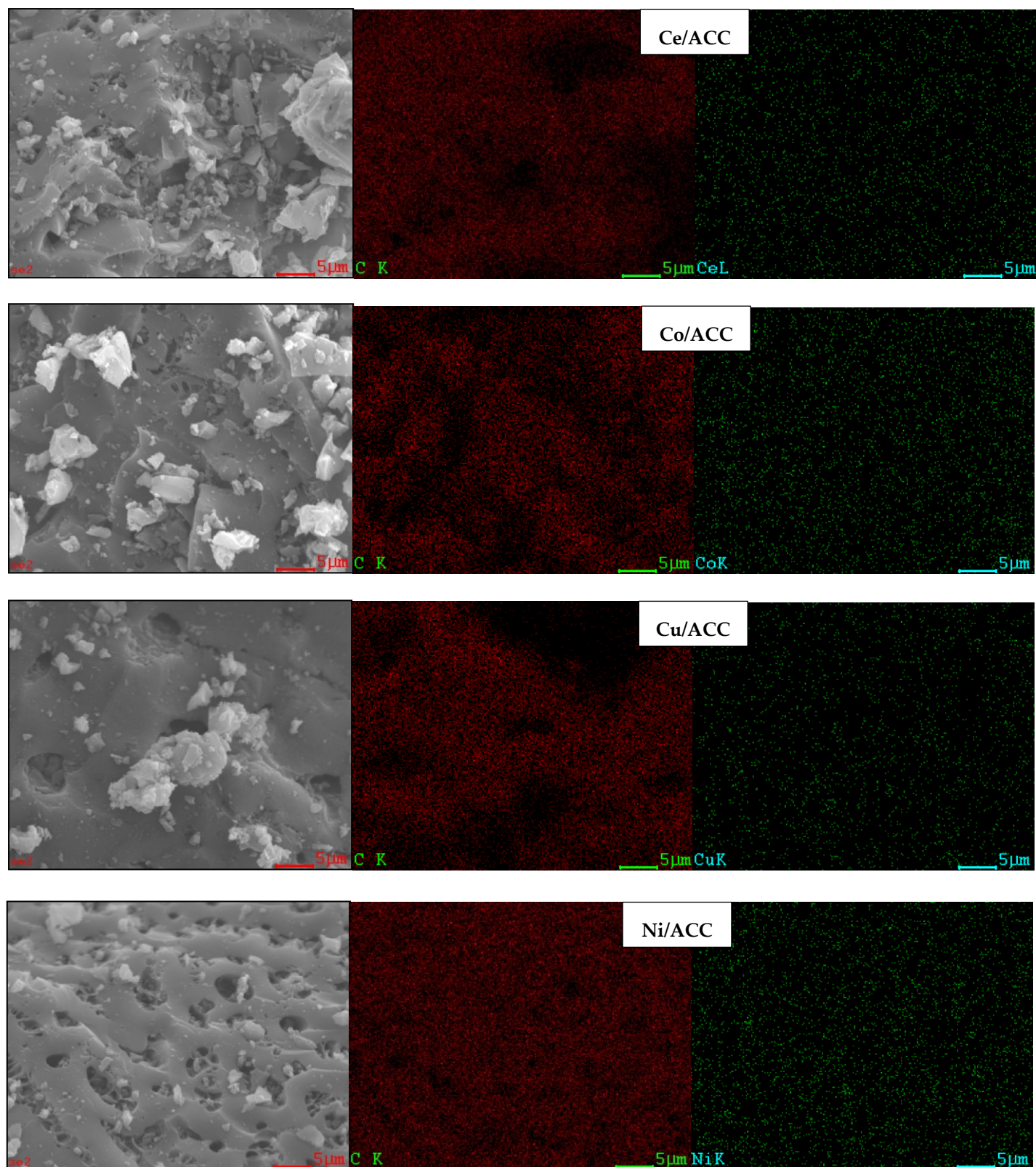


Figure S2. EDX of metal on commercial activated carbons.

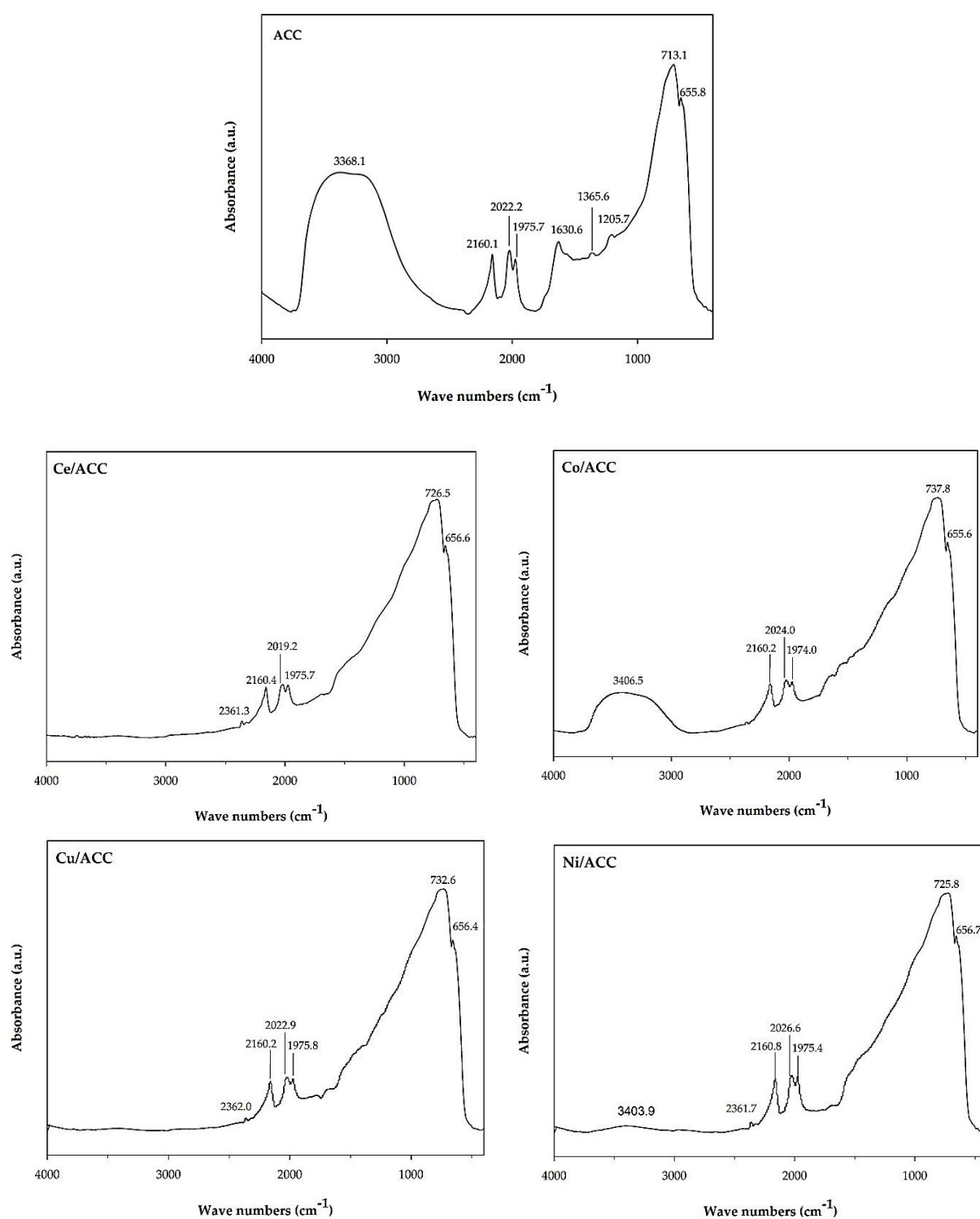


Figure S3. FTIR spectra of catalysts.

Table S2. Functional group of activated carbons.

Catalysts	Assignment	Remark	Wave number (cm ⁻¹)
ACC	$\nu(\text{O-H})$	Hydroxyl group as alcohol	3368
	$\text{C}\equiv\text{C}$	Alkyne groups	2160
	$\text{C}=\text{C}$ asymmetric stretch	Alkene groups	2022
	$\text{C}=\text{C}$ asymmetric stretch	Alkene groups	1976
	$\nu(\text{C}=\text{C})$	Alkene groups	1631
	C-O or C-OH	Ethers or phenolic groups	1366
	C-O or C-OH	Ethers or phenolic groups	1206
	O-H bend (out-of-plane)	Alcohols and phenols	713
Ce/ACC	$\gamma(\text{O-H})$	Hydroxyl group	656
	$\text{C}\equiv\text{C}$	Alkyne groups	2361
	$\text{C}\equiv\text{C}$	Alkyne groups	2160
	$\text{C}=\text{C}$ asymmetric stretch	Alkene groups	2019
	$\text{C}=\text{C}$ asymmetric stretch	Alkene groups	1976
	O-H bend (out-of-plane)	Alcohols and phenols	727
	$\gamma(\text{O-H})$	Hydroxyl group	657
Co/ACC	O-H stretching	Hydroxyl groups	3407
	$\text{C}\equiv\text{C}$	Alkyne groups	2160
	$\text{C}=\text{C}$ asymmetric stretch	Alkene groups	2024
	$\text{C}=\text{C}$ asymmetric stretch	Alkene groups	1974
	O-H bend (out-of-plane)	Alcohols and phenols	738
	$\gamma(\text{O-H})$	Hydroxyl group	656
Cu/ACC	$\text{C}\equiv\text{C}$	Alkyne groups	2362
	$\text{C}\equiv\text{C}$	Alkyne groups	2160
	$\text{C}=\text{C}$ asymmetric stretch	Alkene groups	2023
	$\text{C}=\text{C}$ asymmetric stretch	Alkene groups	1976
	O-H bend (out-of-plane)	Alcohols and phenols	733
	$\gamma(\text{O-H})$	Hydroxyl group	656
Ni/ACC	O-H stretching	Hydroxyl groups	3404
	$\text{C}\equiv\text{C}$	Alkyne groups	2362
	$\text{C}\equiv\text{C}$	Alkyne groups	2161
	$\text{C}=\text{C}$ asymmetric stretch	Alkene groups	2027
	$\text{C}=\text{C}$ asymmetric stretch	Alkene groups	1976
	O-H bend (out-of-plane)	Alcohols and phenols	726
	$\gamma(\text{O-H})$	Hydroxyl group	657

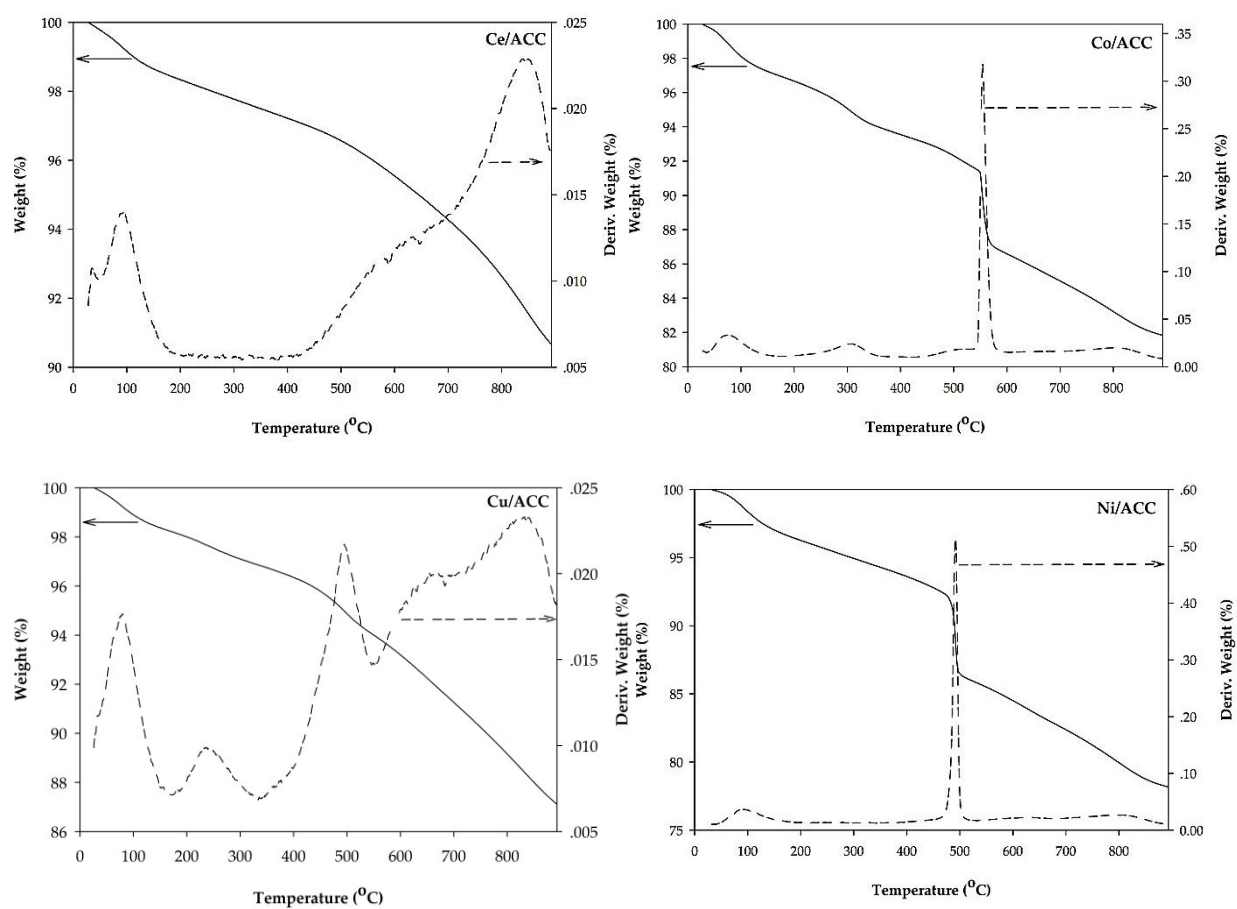


Figure S4. Thermal analysis of activated carbon-supported metal catalysts.

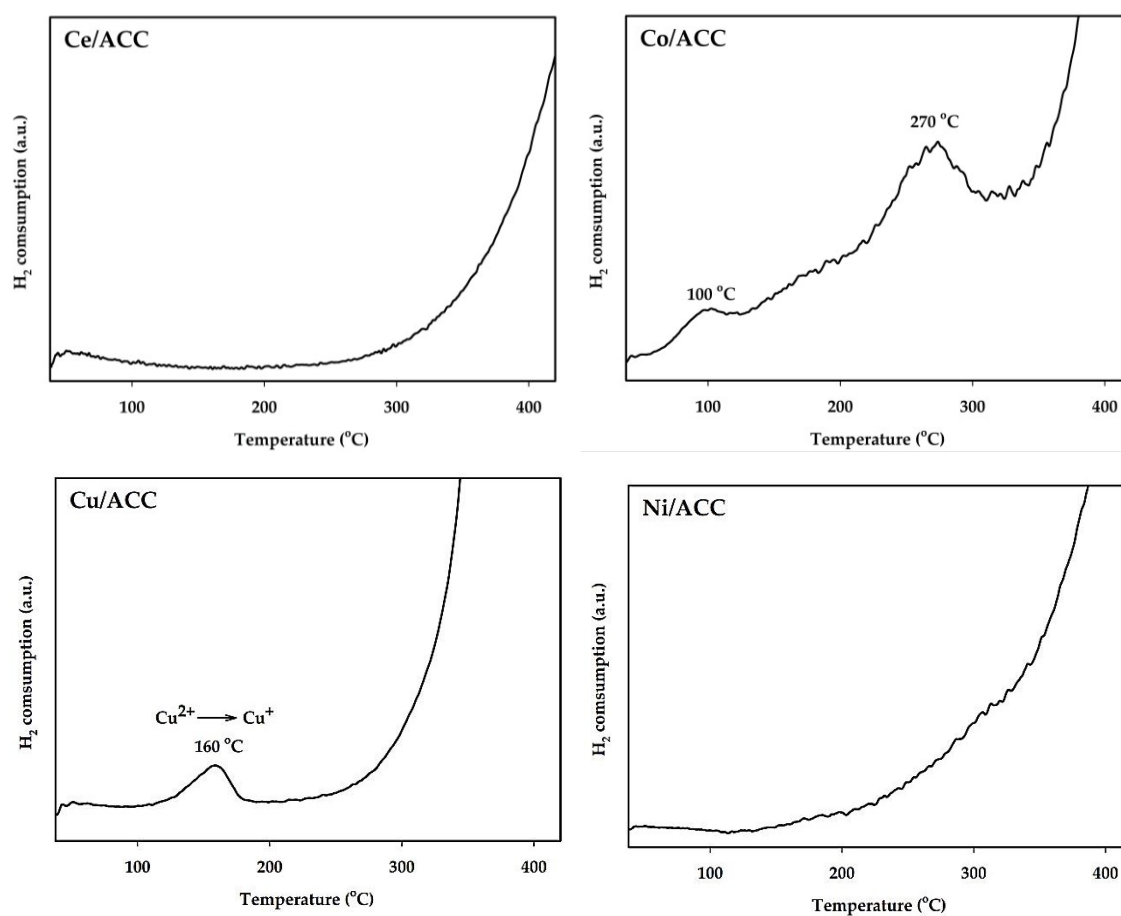


Figure S5. TPR profiles of activated carbon-supported metal catalysts.