materials

MDPI

Supplementary Materials

Amorphous RuCoP ultrafine nanoparticles supported on carbon as efficient catalysts for hydrogenation of adipic acid to 1,6-hexanediol

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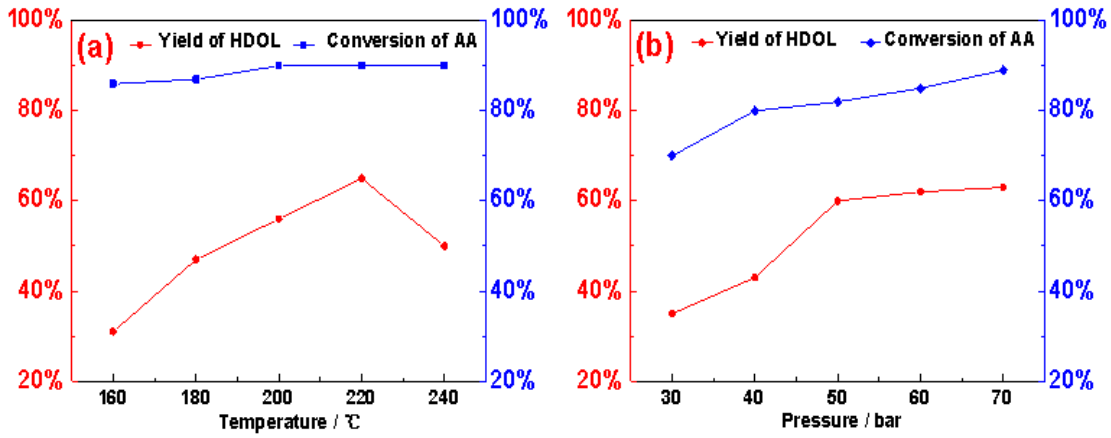
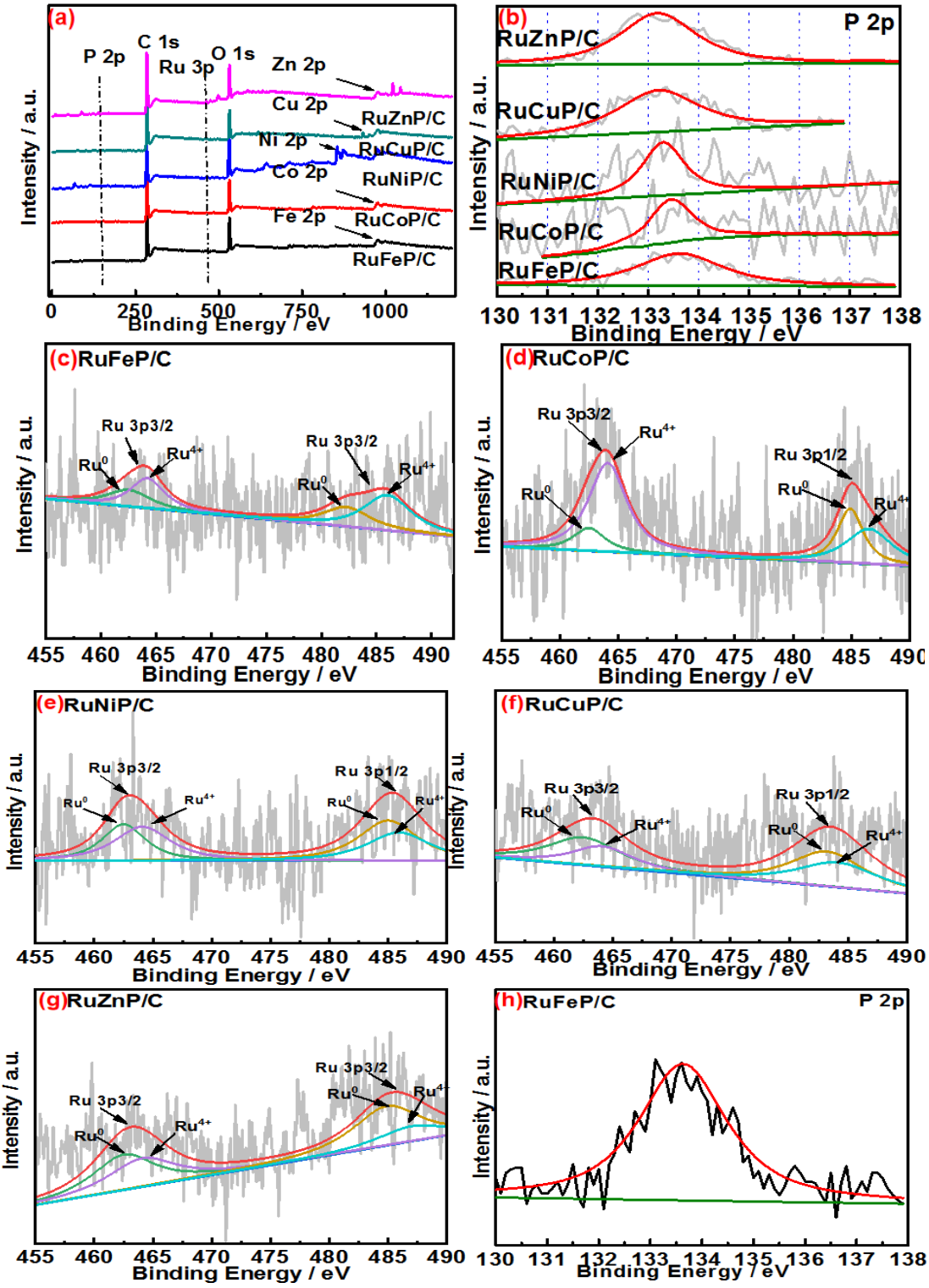


Figure S1. Effect of temperature (**a**) and pressure (**b**) on AA conversion and HDOL selectivity.


(a)
P 2p
C 1s
Ru 3p
O 1s
Zn 2p
Cu 2p
Ni 2p
Co 2p
Fe 2p
RuZnP/C
RuCuP/C
RuNiP/C
RuCoP/C
RuFeP/C
Intensity / a.u.
Binding Energy / eV
(b)
P 2p
RuZnP/C
RuCuP/C
RuNiP/C
RuCoP/C
RuFeP/C
Intensity / a.u.
Binding Energy / eV
(c)RuFeP/C
(d)RuCoP/C
(e)RuNiP/C
(f)RuCuP/C
(g)RuZnP/C
(h)RuFeP/C
Ru 3p3/2
Ru 3p1/2
Ru0
Ru4+

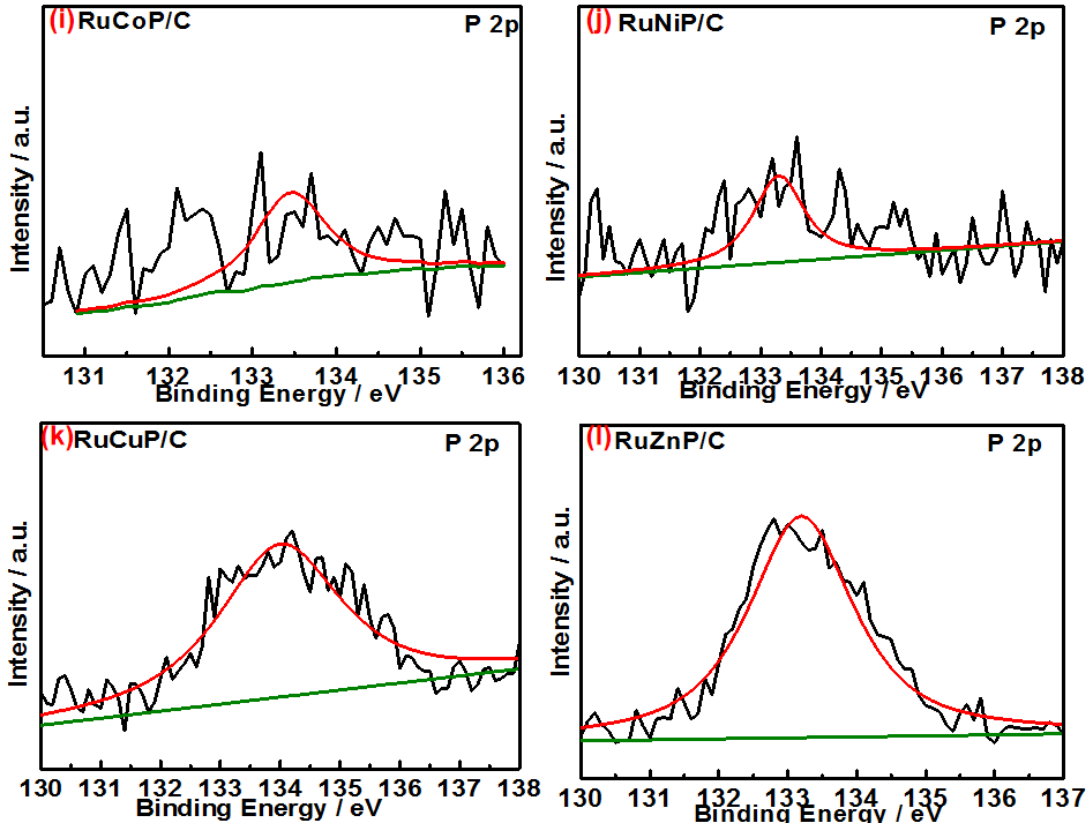


Figure S2. XPS survey spectra of all the alloys (**a**); P 2p XPS spectra of the different metal-doped alloy(**b**); Ru 3p XPS spectra of RuFeP(**c**), RuCoP(**d**) , RuNiP (e), RuCuP(**f**) and RuZnP(**g**) and P 2p XPS spectra of RuFeP(**h**) , RuCoP(**i**), RuNiP (**j**), RuCuP (**k**) and RuZnP (**l**).

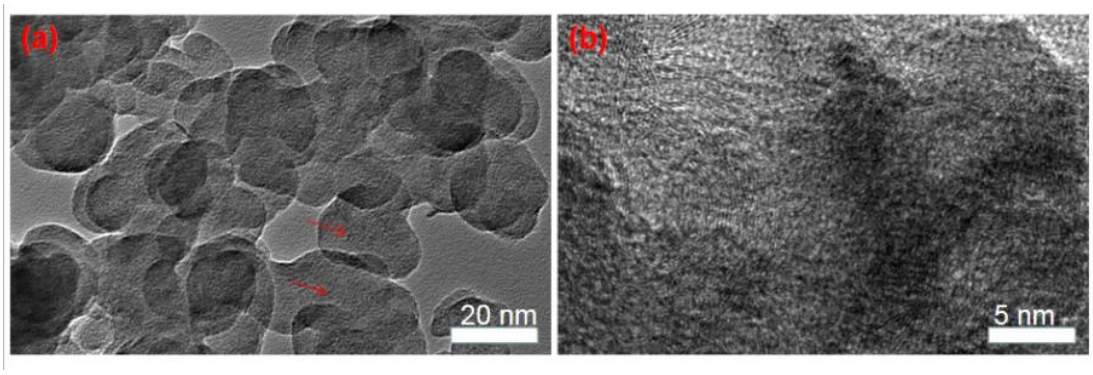


Figure S3. TEM images (**a** and **b**) of RuCoP/C.

Table S1. Assignments binding energies (BEs) and concentrations of Ru 3p species in as-prepared alloys from Ru 3p XPS spectra.

Catalyst	Ru 3p	BE[a]	Concentration[b]
RuFeP/C	Ru^{o} Ru^{4+}	462.5, 482.5 464.5, 486	0.42 0.58
RuCoP/C	Ru^{0} Ru^{4+}	462.5, 485 464, 486.5	0.53 0.47
RuNiP/C	Ru^{0} Ru^{4+}	462.5, 485 464, 486	0.49 0.51
RuCuP/C	Ru^{0} Ru^{4+}	462.5, 483 464, 484	0.63 0.37
RuZnP/C	Ru^{0} Ru^{4+}	462.5, 485 464.5, 487.5	0.45 0.55

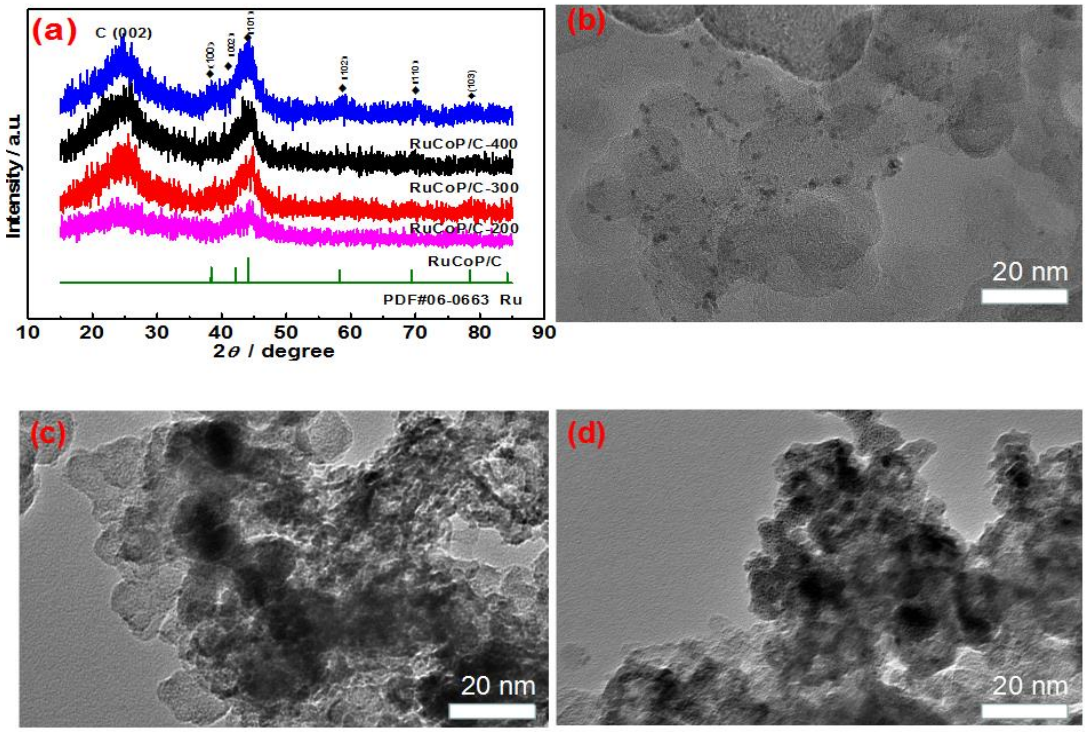


Figure S4. (**a**) XRD patterns of RuCoP samples heat-treated at different temperatures. TEM images of RuCoP/C-200(**b**), RuCoP/C-300 (**c**) and RuCoP/C-400 (**d**).

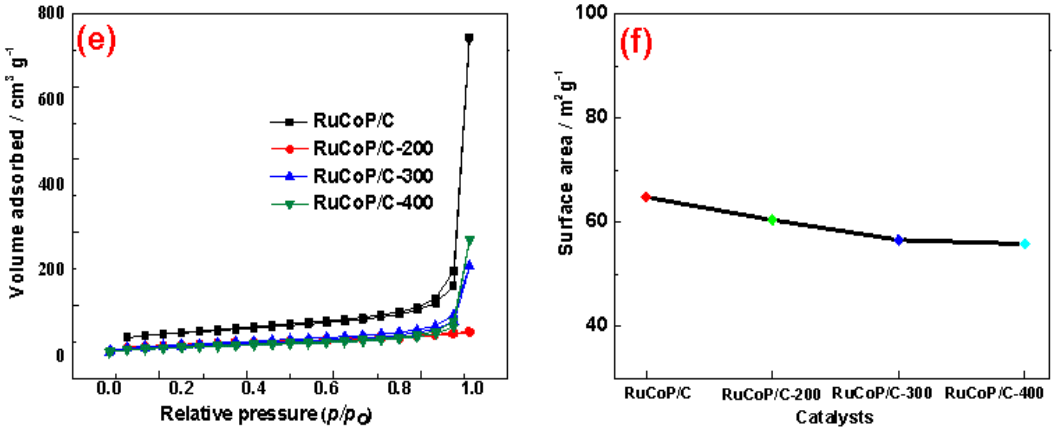


Figure S5. N_2 adsorption and desorption isotherm (**e**), and BET surface areas of RuCoP/C treated at various temperatures (**f**).