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Electronic Supplementary Information

Palladium catalyzes hydrogen production from formic acid: significant impact of support polypyrrole

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$$TOF = \frac{P_{atm} V_{H_2}}{RT n_{Pd} t}$$ Equation S1

The equation S1 can learn about the catalytic performance of Pd/PPy-S1 and Pd/PPy-S2. Where *TOF* is turnover frequency at a certain conversion of formic acid to hydrogen, V_{H_2} is the the volume of hydrogen produced, n_{Pd} is the mole number of the Pd, *R* is the universal gas constant (8.314 m^3·Pa/(mol·K)), P_{atm} is the atmospheric pressure (101325 Pa), T is the reaction temperature at 333K, and *t* is for the reaction time of 5 h.

Table S1 The catalyst activity data of Pd/PPy-S1 for hydrogen production from formic acid.

Catalyst	T/K	Solvent	hydrogen production/mL
Pd/PPy-S1	298	formic acid and sodium formate	1
	333	formic acid	3
	333	formic acid and sodium formate	22

Table S2 Comparison of some catalysts used in formic acid dehydrogenation reaction.

Catalyst	T/K	Reactants	hydrogen production rate	TOF/h^{-1}	Reference
Pd/C	303	formic acid:sodium formate = 4:1	16.82 mL H_2 in 2 h	35.5	53
CoAuPd NPs	298	formic acid	70 mL mL H_2 in 400 min	13.3	54
150 sc% Pd-on-Au/C	296	formic acid	22.5 mL mL H_2 in 3 h	35.2	55
Au/MgAl-LDH	333	formic acid and sodium formate	11.5 mL H_2 in 10 h	4.1	56
Pd/PPy-S1	333	formic acid and sodium formate	22 mL H_2 in 5 h	8.6	This work
Pd/PPy-S2	333	formic acid and sodium formate	19 mL H_2 in 5 h	7.4	This work

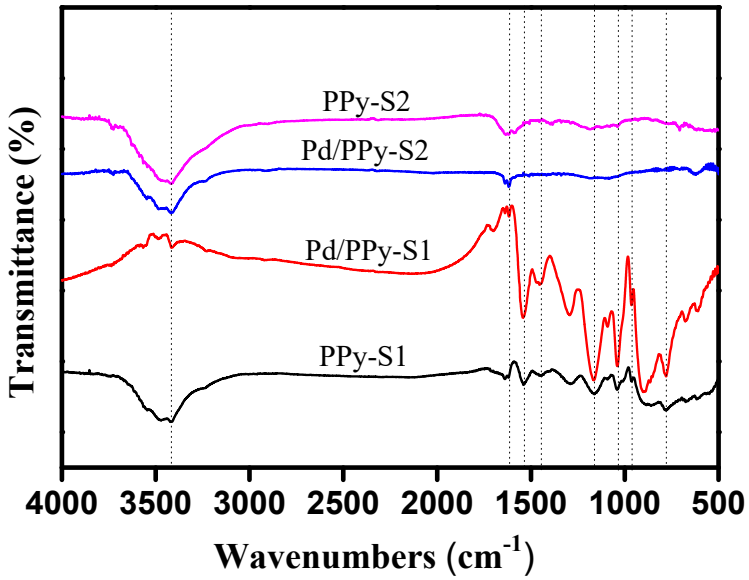

Fig. S1 FT-IR spectra of PPy and Pd/PPy.

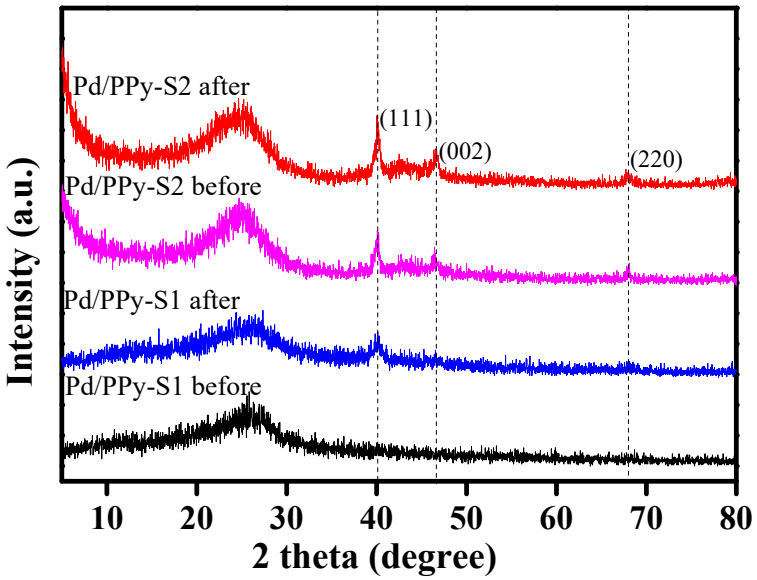

Fig. S2 XRD patterns of Pd/PPy-S1 and Pd/PPy-S2 before and after the catalytic reaction.