Supporting Information

Preparation and application of coconut shell activated carbon immobilized palladium complexes

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Fig.S1 Schematic diagram of bath catalytic reaction in a high pressure reaction vessel.
1-CO cylinder; 2-O₂ cylinder; 3-mass flowmeter; 4-dryer; 5-valve; 6-250 mL high-pressure reaction vessel; 7-controller of high-pressure reactor; 8-reactor effluent.
**Fig.S2** Schematic diagram of continuous catalytic reaction in a fixed-bed reactor. 1-O₂ cylinder; 2-CO cylinder; 3,4-mass flowmeter; 5-raw material tank; 6-metering pump; 7-buffer tank; 8-fixed-bed reactor; 9-gas-liquid separator; 10-bunker; 11-condenser; 12-cistern; 13-gas chromatograph

**Fig.S3** XPS spectra of (a) Oxidized CSAC and (b) AEAPTMS silanized CSAC
**Fig. S4** XPS spectra of (a) Oxidized CSAC, (b) CMPTCS silanized CSAC and (c) Benzyl malononitrile ligand grafted CSAC.

**Fig. S5** XPS spectra of (a) Oxidized CSAC, (b) CPTMS silanized CSAC and (c) Propyl malononitrile grafted CSAC.
Fig. S6 Pore size distributions of (a) Raw CSAC, (b) Oxidized CSAC, (c) Ethylenediamine complexed Pd$^{2+}$ catalyst, (d) Benzyl malononitrile complexed Pd$^{2+}$ catalyst and (e) Propyl malononitrile complexed Pd$^{2+}$ catalyst.
Fig.S7  FT-IR spectra of catalysts after 75 h catalytic performance in packed bed. (a) Ethylenediamine complexed catalyst, (b) Benzyl malononitrile complexed catalyst