Electronic Supplementary information for:

Protodecarboxylation of carboxylic acids over heterogeneous silver catalysts

Xiu Yi Toy, [a] Irwan Iskandar Bin Roslan[a], Gaik Khuan Chuah[a] and
Stephan Jaenicke*[a]
Department of Chemistry, National University of Singapore
Kent Ridge, Singapore 117543, Singapore
e-mail: chmsj@nus.edu.sg

1. X–ray diffractograms of 10 wt. % Ag on different supports
2. Nitrogen adsorption and desorption isotherms for Al_2O_3-supported Ag catalysts with 5 to 20 wt % loading. (Inset: pore size distribution curves).
3. Powder x-ray diffraction patterns of (a) calcined Al_2O_3 support (b) 5 (c) 10 (d) 15 and (e) 20 wt % Ag/Al_2O_3
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6. Effect of the amount of K_2CO_3
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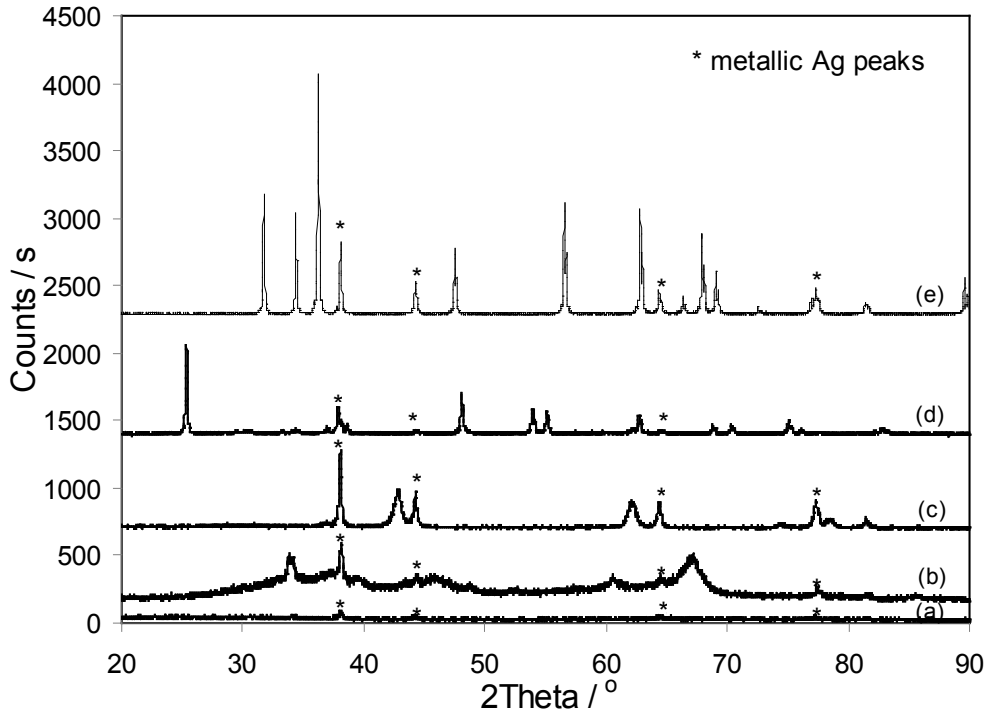

Fig. S1. X–ray diffractograms of 10 wt. % Ag supported on (a) SiO_2 (b) Al_2O_3 (c) MgO (d) TiO_2 and (e) ZnO.

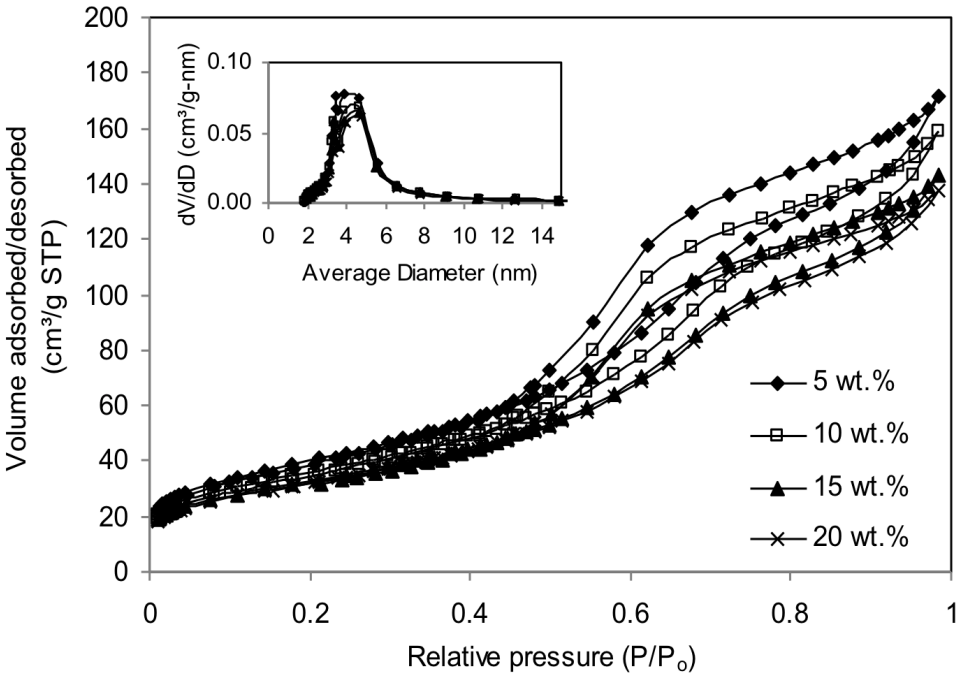

Fig. S2. Nitrogen adsorption and desorption isotherms for Al_2O_3-supported Ag catalysts with 5 to 20 wt % loading. (Inset: pore size distribution curves).

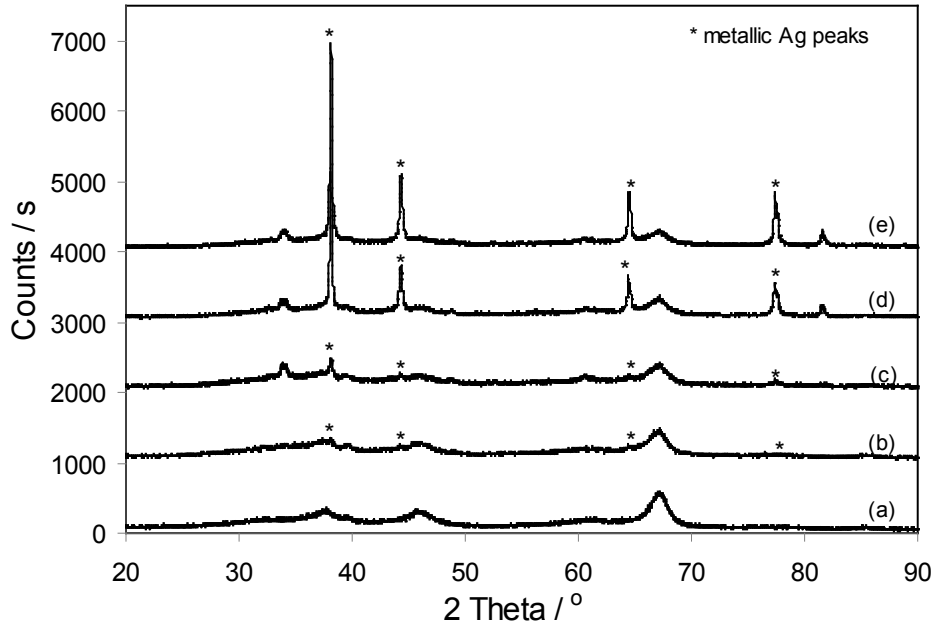

Fig. S3. Powder x-ray diffraction patterns of (a) calcined Al_2O_3 support (b) 5 (c) 10 (d) 15 and (e) 20 wt % Ag/Al_2O_3 (traces are offset by 1000 counts).

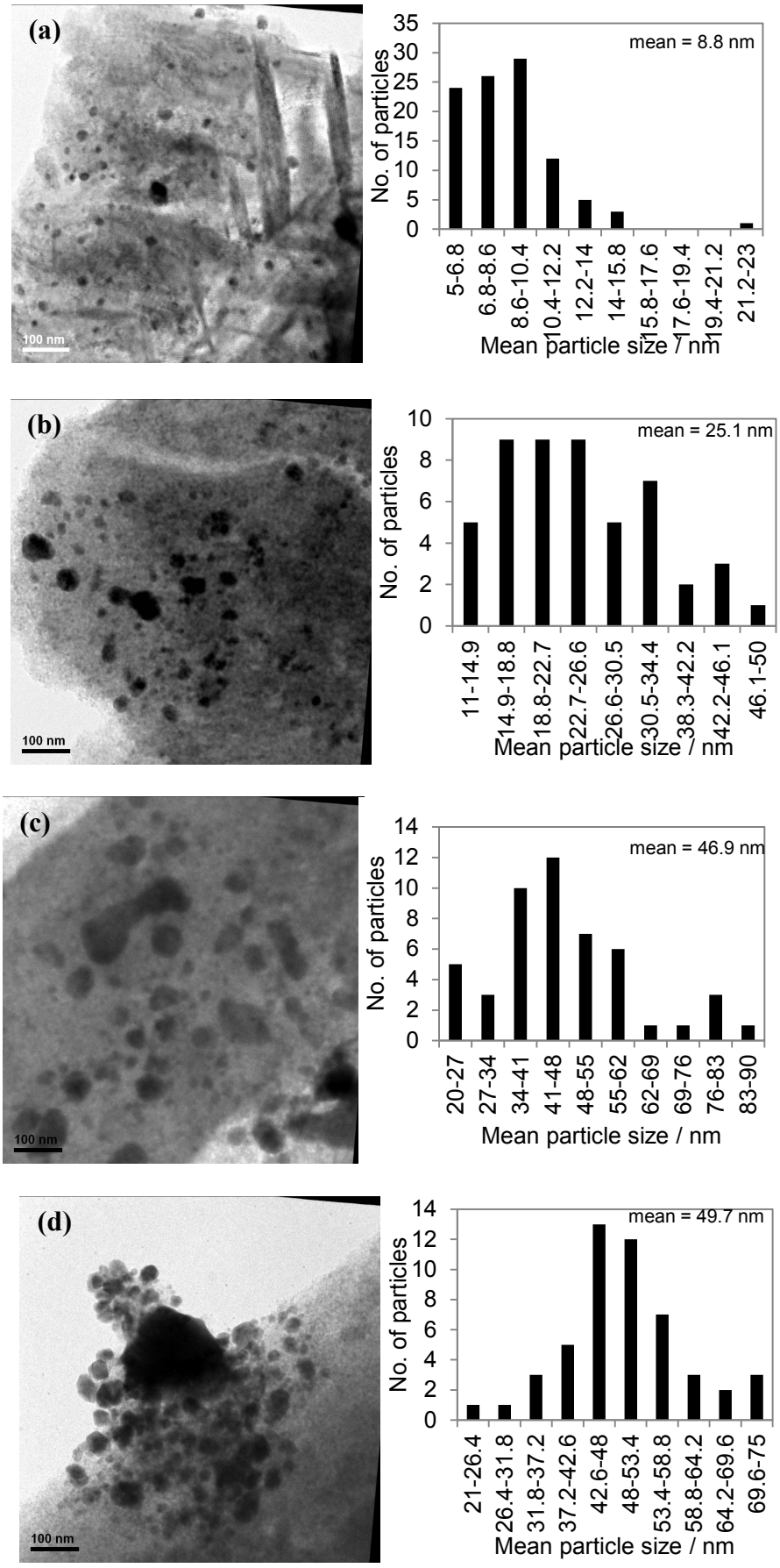

Fig. S4. TEM images of (a) 5 wt %, (b) 10 wt %, (c) 15 wt %, (d) 20 wt % Ag/Al_2O_3.

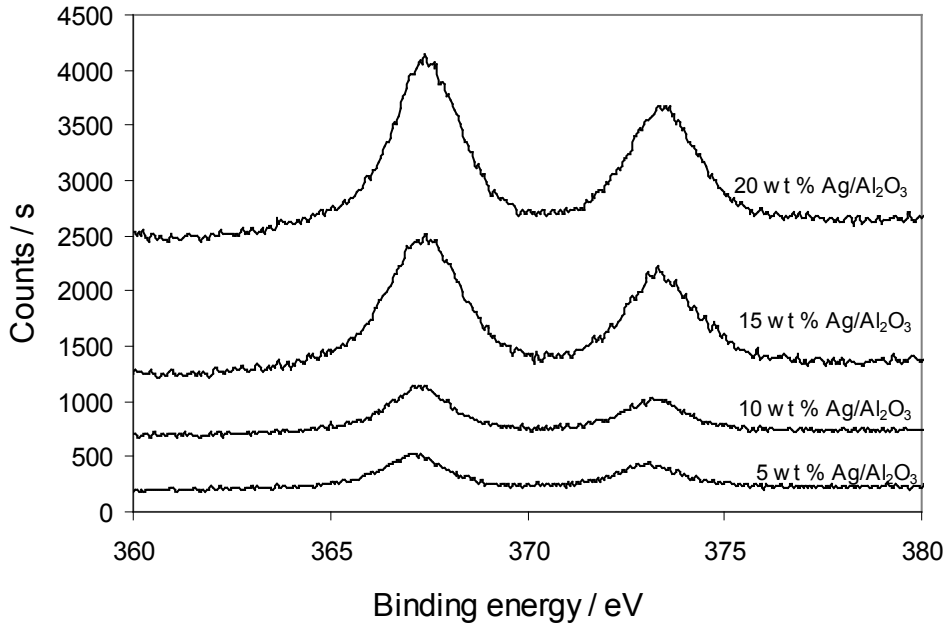

Fig. S5. Ag $3d_{5/2}$ photoelectron spectra for 5-15 wt % Ag/Al_2O_3.

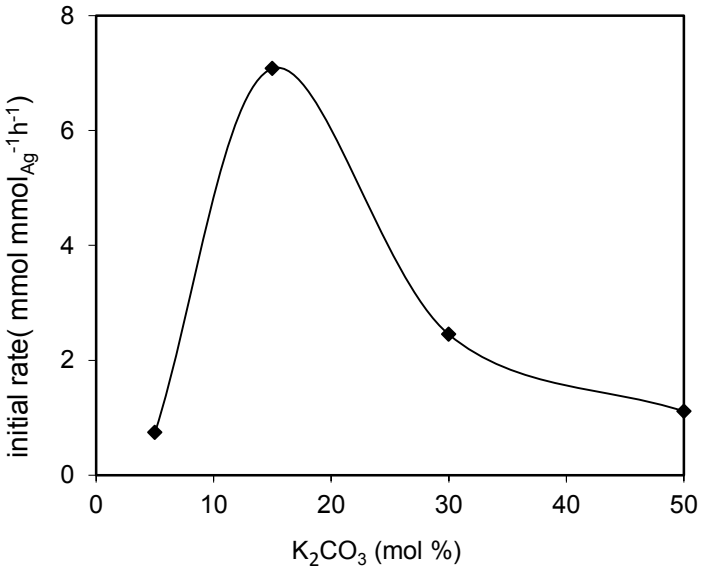

Fig. S6. Plot of initial rate versus mol % of K_2CO_3.

Estimation of surface Ag atoms

The supported Ag nanoparticles has a *fcc* crystal lattice structure and each atom is surrounded by twelve others, according to a full shell close packing model. The total number of Ag atoms (N_T) can be estimated according to equation (1), where <d> correspond to the mean diameter of Ag particles determined experimentally by Scherrer's equation using XRD data and d_{at} is the atomic diameter of Ag (0.289 nm). Number of shells, m, can be determined using equation (2) and used to estimate the total number of external atoms, N_s, according to equation (3). [27,28]

$$< d >= 1.105 \times d_{at} \times N_T^{1/3} \quad (1)$$

$$N_T = \frac{(10m^3 - 15m^2 + 11m - 3)}{3} \quad (2)$$

$$N_s = 10m^2 - 20m + 12 \quad (3)$$

Table S1. Effect of silver loading on crystallite size and catalytic activity of Ag/Al_2O_3

Ag loading (wt. %)	Crystallite size (nm)	N_s x10^3 /particle	$N_{s.rxn}$ x 10^{18}	Initial rate (mmol.mmol$_{Ag}$h)	TOF[a] (h^{-1})
5	5	1	31	5.1	19.6
10	40	70	4.3	7.6	216
15	63	170	2.8	3.9	173
20	93	380	1.8	1.9	125
AgOAc	—	—	121	6.2	6.2
Ag[b]	2,200[d]	350,000	0.06	0.047	90
Ag[c]	22,000[d]	35,000,000	0.006	0.005	94
Ag_2O[b]	84	310	4.3	0.8	43
Ag_2O[c]	94	390	3.9	0.5	32

Reaction conditions: 2 mmol 2-nitrobenzoic acid, 0.2 mmol Ag, 15 mol % K_2CO_3, 4 mL DMA, 120 ºC.
[a]with respect to number of surface Ag atoms on the catalyst
[b]ex-Ag_2CO_3
[c]commercial source
[d]calculated from BET surface area