Thermal Decomposition of Silver Acetate: Physico-Geometrical Kinetic Features and Formation of Silver Nanoparticles

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S1. Sample Characterization

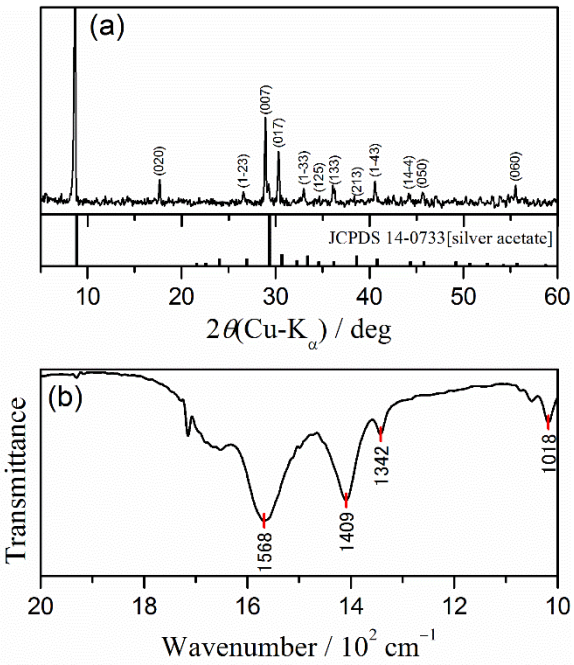

Figure S1. (a) XRD pattern and (b) FT-IR spectrum of as-received silver acetate sample.

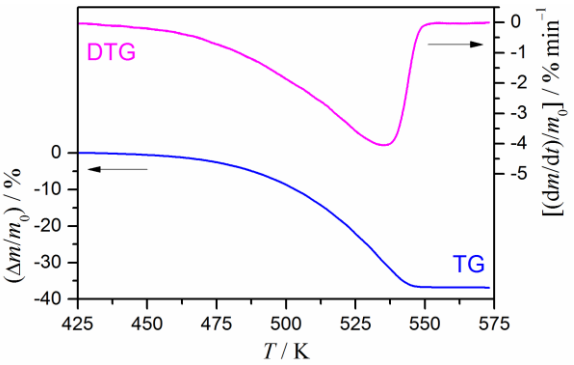

Figure S2. Typical TG–DTG curves for thermal decomposition of as-received silver acetate sample (m_0 = 1.96 mg) at a β = 5 K min^{-1} in flowing N_2 (80 cm^3 min^{-1}).

S2. Thermal Decomposition Process

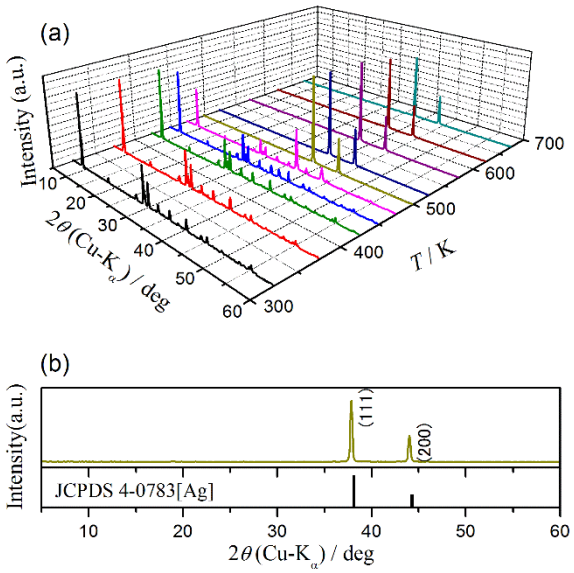

Figure S3. Changes in XRD patterns during stepwise isothermal heating of silver acetate in flowing N_2 (100 cm^3 min^{-1}): (a) changes in XRD patterns with temperature and (b) XRD pattern of solid product.

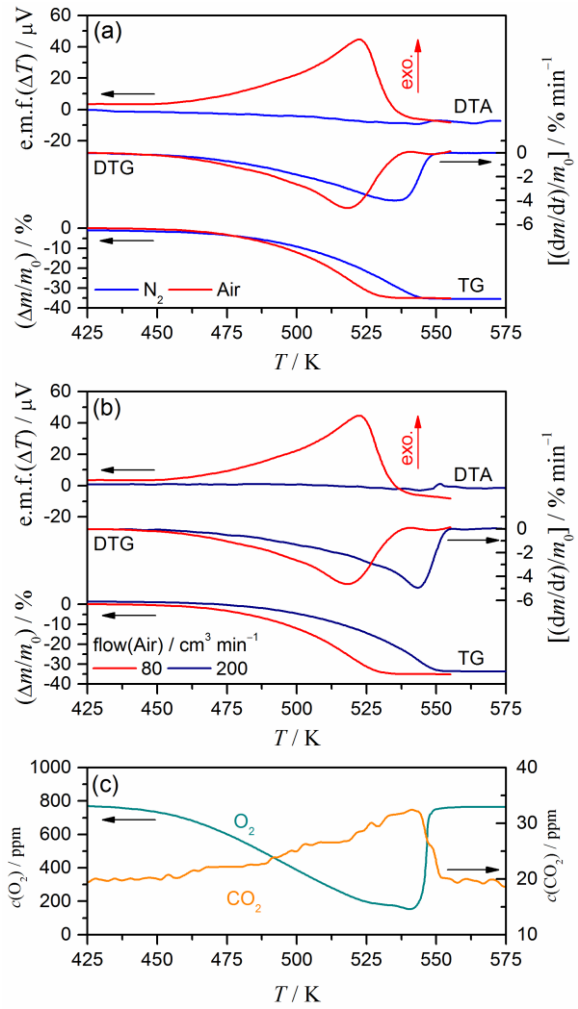

Figure S4. Influences of atmospheric conditions on TG–DTG–DTA curves for thermal decomposition of silver acetate (m_0 = 2.02 ± 0.04 mg) at β = 5 K min^{-1}: (a) comparison of curves obtained in flowing N_2 and air (80 cm^3 min^{-1}), (b) comparison of curves obtained in flowing air at flow rates of 80 and 200 cm^3 min^{-1}, and (c) curves obtained in flowing N_2–air mixture ($c(O_2)$ = 800 ppm) at rate of 500 cm^3 min^{-1} and changes in concentrations of O_2 and CO_2 in outlet gas during reaction.

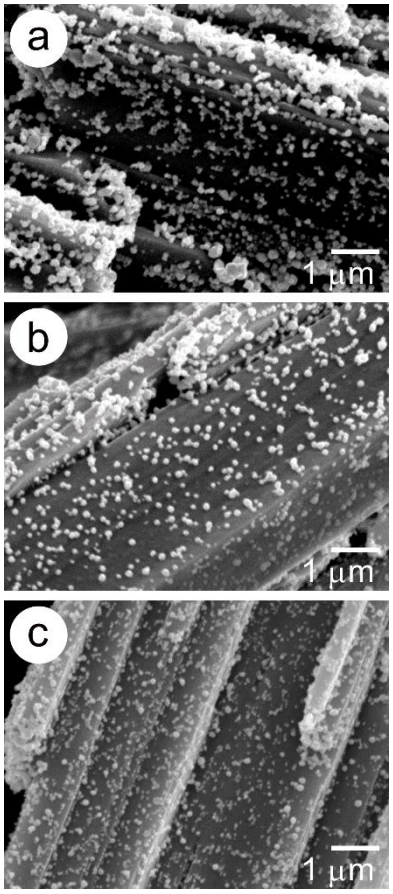

Figure S5. SEM images of partially decomposed samples (α = 0.3) obtained by heating under isothermal conditions in flowing N_2 (80 cm^3 min^{-1}): (a) 438 K, (b) 453 K, and (c) 468 K.

S3. Impact of Atmospheric Water Vapor on the Kinetics

Table S1. Initial kinetic parameters for the kinetic deconvolution analysis of thermal decomposition of silver acetate in flowing N_2–H_2O with controlled $p(H_2O)$

$p(H_2O)$ / kPa	i	c_i	$E_{a,i}$ / kJ mol^{-1}, [a]	A_i / s^{-1}	SB(m, n, p)		
					m_i	n_i	p_i
0.2	1	0.20	84.6	2.0×10^7	0	1	0
	2	0.80	78.1	5.0×10^5	0	1	0
4.0	1	0.20	91.6	2.0×10^8	0	1	0
	2	0.80	85.2	5.0×10^6	0	1	0
16.3	1	0.20	108.0	2.0×10^{10}	0	1	0
	2	0.80	88.3	2.0×10^7	0	1	0

[a] average values at different α (1st step: $0.05 \le \alpha \le 0.10$, 2nd step: $0.20 \le \alpha \le 0.70$).

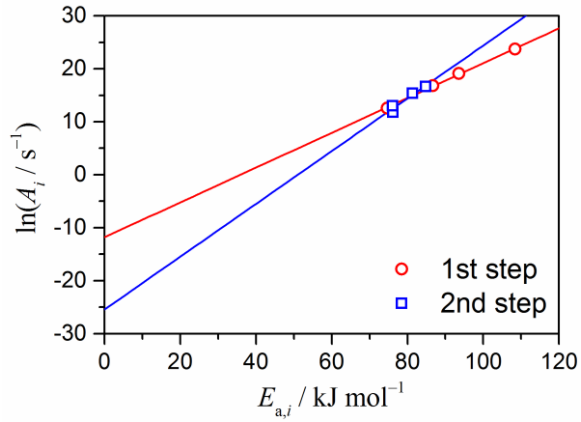

Figure S6. Mutual dependence of E_a and ln A values determined under different $p(H_2O)$.

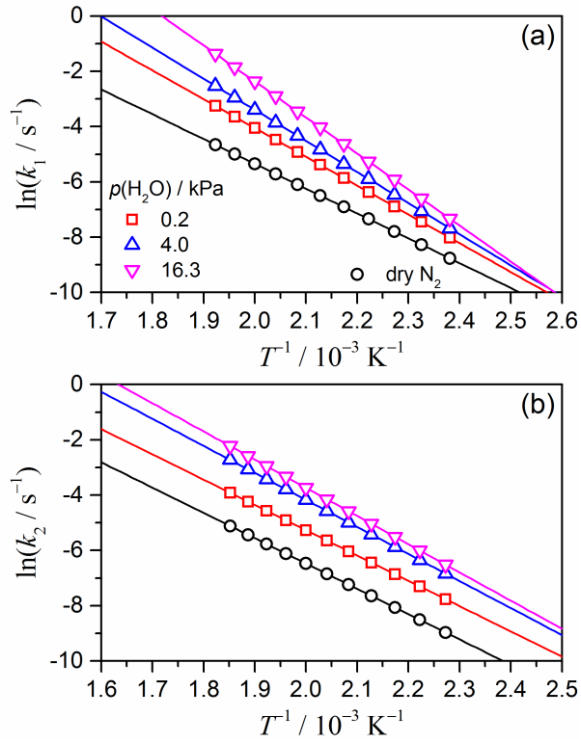

Figure S7. Comparisons of Arrhenius plots for the reactions under different $p(H_2O)$ simulated using E_a and A values determined by kinetic deconvolution analysis: (a) first reaction step and (b) second reaction step.