Supplementary material

Aqueous phase reforming and hydrodeoxygenation of ethylene glycol on Pt/SiO_2-Al_2O_3: effects of surface acidity to product distribution

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Supplementary **Table S1** EG conversion and selectivity of aqueous phase reforming (APR) reaction at a similar conversion on the Pt/SA catalysts.

Supplementary **Table S2** represents the EG conversion and selectivity of aqueous phase reforming (APR) reaction with a different platinum content on the SA(0.1) support.

Supplementary **Figure S1** represents the conversion of EG to gaseous products with time on stream on the Pt/SA(0.1) for APR reaction at the reaction conditions of T = 250 ^{o}C, P = 4.5 MPa and weight hourly space velocity (WHSV) = 0.5, 1.0 and 2.0 h^{-1} for 10 h with 0.3 g catalyst using 10wt%EG reactant in an aqueous solution.

Supplementary **Figure S2** represents the hydrocarbon productivity (ml/(g_{cat}·h)) with time on stream on the Pt/SA catalysts during APR reaction at the reaction conditions of T = 250 ^{o}C, P = 4.5 MPa and weight hourly space velocity (WHSV) = 2.0 h^{-1} for 20 h with 0.3 g catalyst using 10wt%EG reactant in an aqueous solution.

Supplementary **Figure S3** represents the hydrocarbon productivity (ml/(g_{cat}·h)) with time on stream on the Pt/SA catalysts during APH reaction at the reaction conditions of T = 260 ^{o}C, P = 5.0 MPa and weight hourly space velocity (WHSV) = 0.6 h^{-1} for 20 h with 0.5 g catalyst using 10wt%EG reactant in an aqueous solution.

Supplementary **Figure S4** represents the pore size distribution (PSD) measured from the desorption branch of N_2 adsorption-desorption isotherms of the fresh Pt/SA catalysts.

Supplementary **Figure S5** represents the XRD patterns of the fresh Pt/SA catalysts.

Supplementary **Figure S6** represents the profiles for a coke deposition on the used Pt/SA catalysts after APR reaction for 20 h.

Table S1. EG conversion and selectivity of aqueous phase reforming (APR) reaction at a similar conversion on the Pt/SA catalysts

Notation	Time (h)	Conversion to gas (%)	Selectivity (%)			
			H_2	CO	CO_2	HC
Pt(5)/SA(0)	1	3.9	72.8	1.9	24.2	1.1
Pt(5)/SA(0.1)	1	4.4	74.3	0.0	24.3	1.4
Pt(5)/SA(0.4)	1	4.7	70.9	2.5	24.1	2.5
Pt(5)/SA(1.0)	1	4.6	68.3	3.2	24.3	4.3
Pt(5)/SA(0)	3	16.1	72.7	1.0	25.3	1.0
Pt(5)/SA(0.1)	2	14.5	72.5	0.5	25.8	1.2
Pt(5)/SA(0.4)	4	15.5	71.1	3.0	23.9	2.0
Pt(5)/SA(1.0)	7	15.7	69.6	6.4	21.0	3.0

[a]The selectivity at a similar EG conversion on 5wt%platinum loaded on different molar ratio of SA support was measured at the reaction conditions of T = 250 ^{o}C and P = 4.5 MPa, and weight hourly space velocity (WHSV) = 2.0 h^{-1} at steady-state after 20 h reaction using 0.3 g catalyst with 10wt% EG reactant in an aqueous solution.

Table S2. EG conversion and selectivity of aqueous phase reforming (APR) reaction with a different platinum content on the SA(0.1) support

Notation	Conversion to gases (%)	H_2 production rate ($mL g_{cat}^{-1} h^{-1}$)	Selectivity (%)				HC selectivity (%)	
			H_2	CO	CO_2	HC	C_1	C_2
Pt(1)/SA(0.1)	19.45	817.1	74.4	0.4	24.6	0.6	63.8	36.2
Pt(3)/SA(0.1)	41.89	1698.6	73.8	0.0	25.2	1.0	57.2	42.8
Pt(5)/SA(0.1)	43.39	1691.4	74.0	0.8	25.4	0.9	36.2	63.8
Pt(7)/SA(0.1)	45.25	1410.2	68.4	0	26.7	5.0	88.6	11.4

[a]The different amount of platinum metal was impregnated on the SA(0.1) support from 3 to 7wt%Pt, and catalytic activity and selectivity were measured at the reaction conditions of T = 250 ^{o}C and P = 4.5 MPa, and weight hourly space velocity (WHSV) = 2.0 h^{-1} for around 20 h using 0.3 g catalyst with 10wt% EG reactant in an aqueous solution.

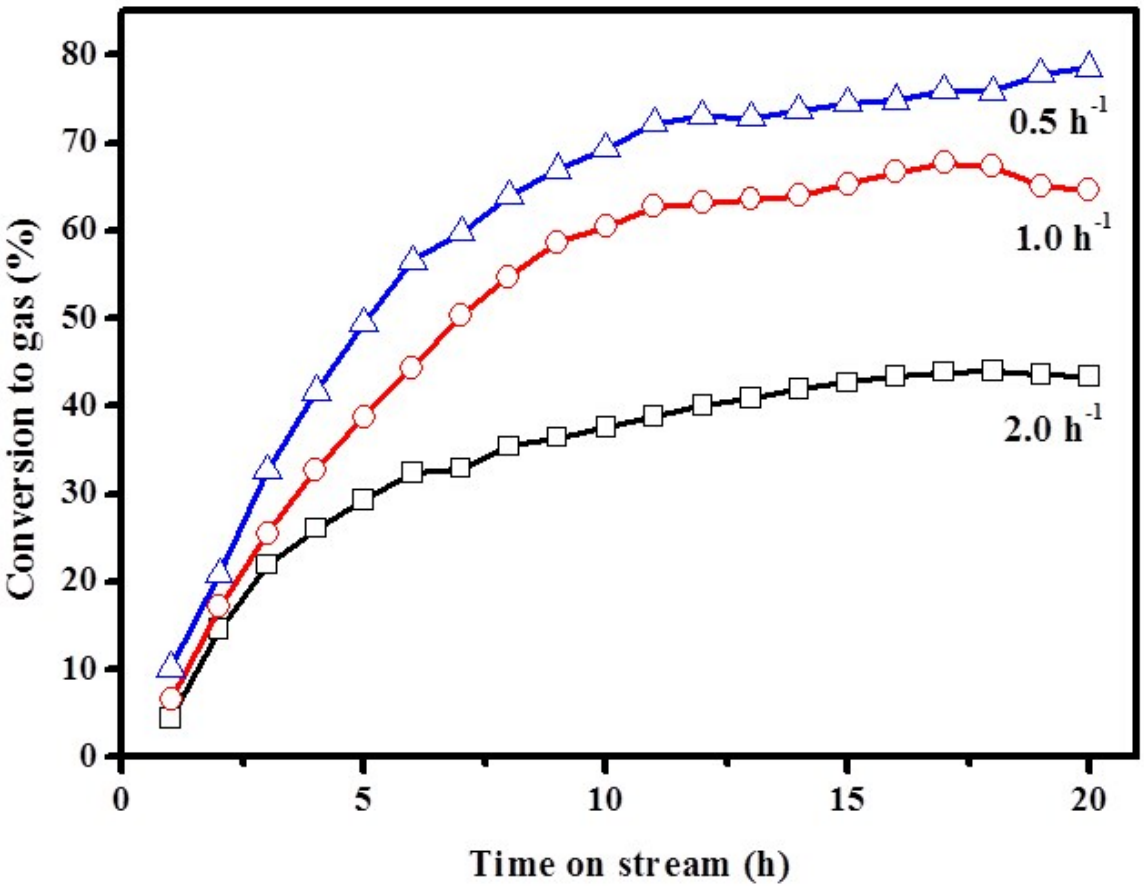

Figure S1. Conversion of EG to gaseous products with time on stream on the Pt/SA(0.1) for APR reaction at the reaction conditions of T = 250 ^{o}C, P = 4.5 MPa and weight hourly space velocity (WHSV) = 0.5, 1.0 and 2.0 h^{-1} for 10 h with 0.3 g catalyst using 10wt%EG reactant in an aqueous solution

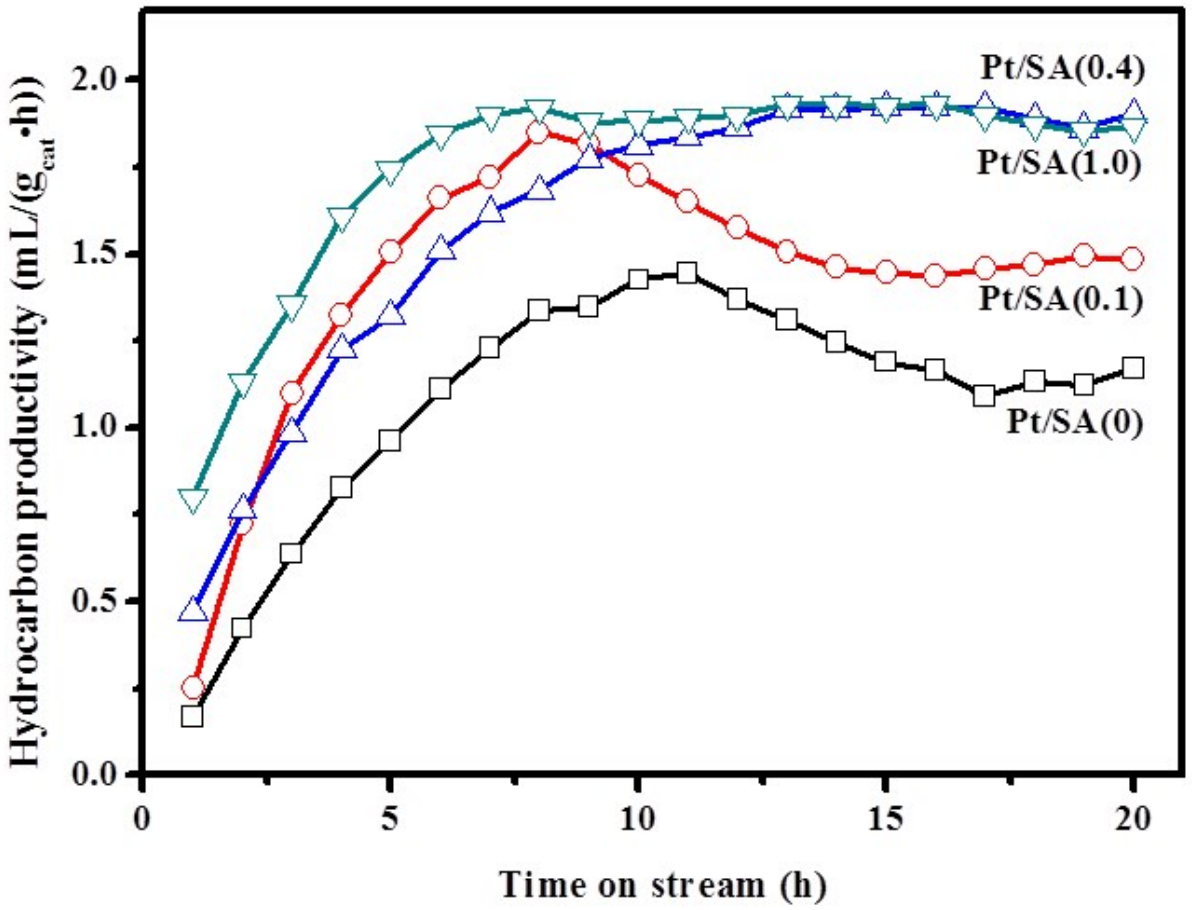

Figure S2. Hydrocarbon productivity (ml/(g_{cat}·h)) with time on stream on the Pt/SA catalysts during APR reaction at the reaction conditions of T = 250 ^{o}C, P = 4.5 MPa and weight hourly space velocity (WHSV) = 2.0 h^{-1} for 20 h with 0.3 g catalyst using 10wt%EG reactant in an aqueous solution

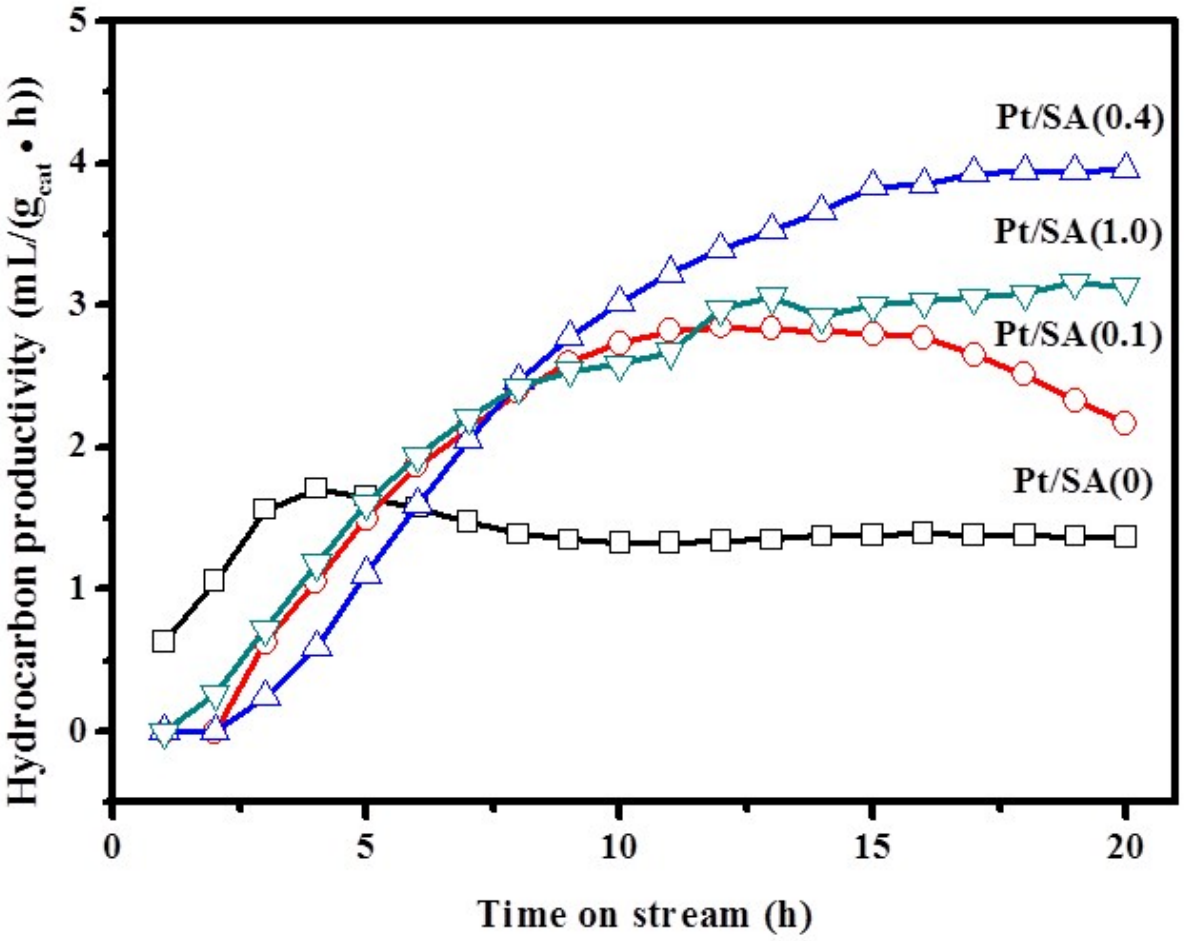

Figure S3. Hydrocarbon productivity (ml/(g_{cat}·h)) with time on stream on the Pt/SA catalysts during APH reaction at the reaction conditions of T = 260 °C, P = 5.0 MPa and weight hourly space velocity (WHSV) = 0.6 h^{-1} for 20 h with 0.5 g catalyst using 10wt%EG reactant in an aqueous solution

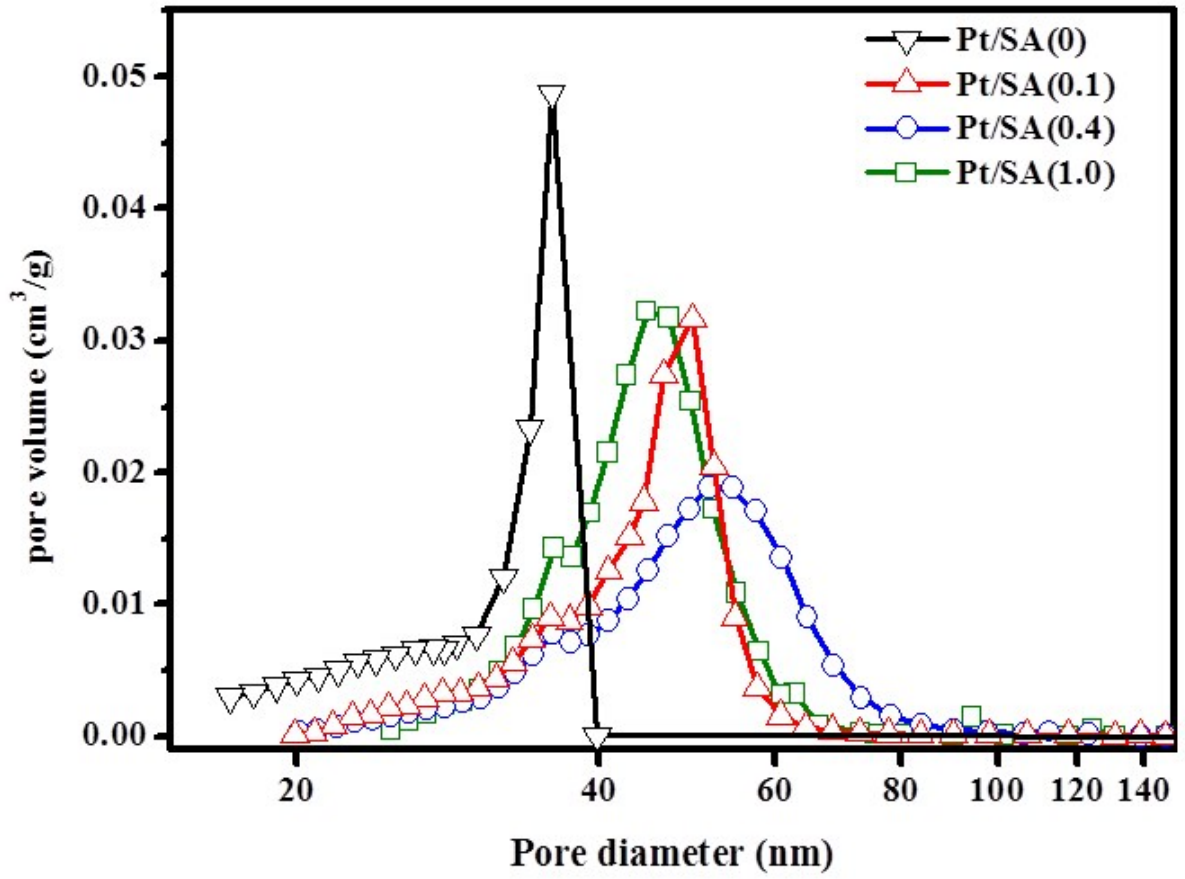

Figure S4. Pore size distribution (PSD) measured from the desorption branch of N_2 adsorption-desorption isotherms of the fresh Pt/SA catalysts

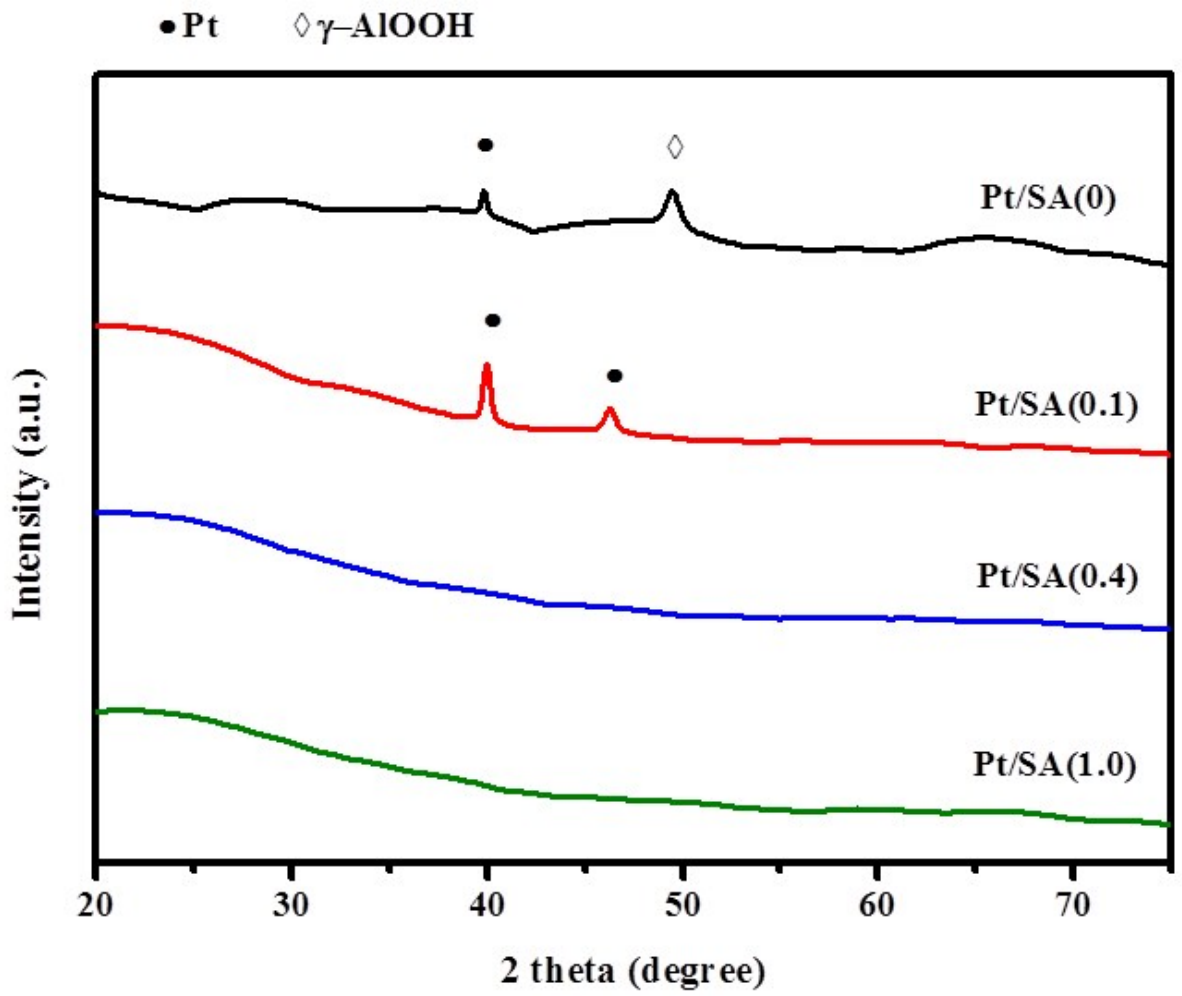

Figure S5. XRD patterns of the fresh Pt/SA catalysts

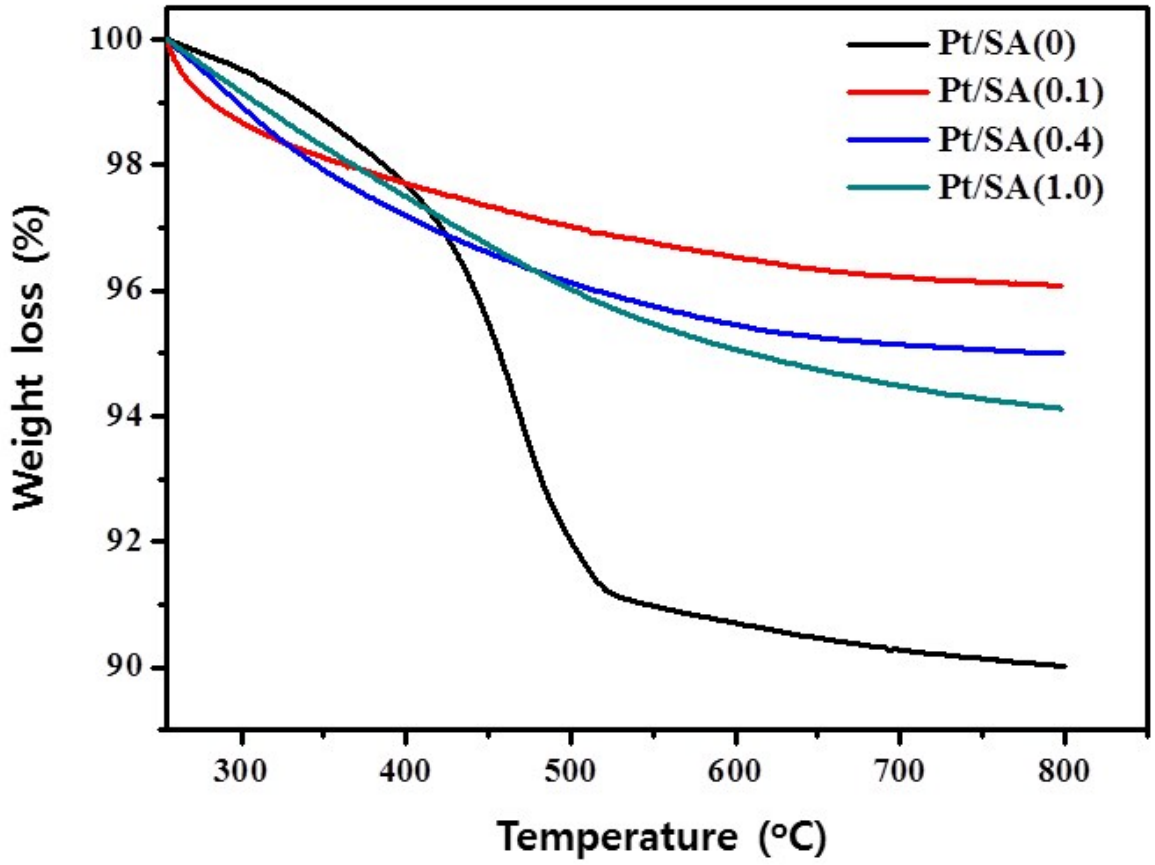

Figure S6. TGA profiles for a coke deposition on the used Pt/SA catalysts after APR reaction for 20 h