APPENDIX B

Data of nitrogen adsorption-desorption isotherm and pore size distribution

B.1 Nitrogen Adsorption-Desorption Data

Table B.1 Nitrogen adsorption-desorption data of CeO_2 prepared by RM method.

Adsorption		Desorption	
P/P_0	**Volume of N_2 adsorb @STP (cc/g)**	**P/P_0**	**Volume of N_2 adsorb @STP (cc/g)**
1.87E-02	0.8772	9.99E-01	35.6307
3.99E-02	0.9746	9.47E-01	12.3373
6.00E-02	1.0440	9.00E-01	6.1665
8.19E-02	1.1033	8.40E-01	4.2138
1.10E-01	1.1834	7.88E-01	3.4630
1.57E-01	1.3013	7.37E-01	3.0237
1.60E-01	1.3269	6.87E-01	2.8264
2.10E-01	1.4470	6.37E-01	2.6489
2.60E-01	1.5792	5.87E-01	2.4958
3.07E-01	1.6808	5.37E-01	2.3598
3.10E-01	1.7169	4.87E-01	2.2289
3.60E-01	1.8684	4.37E-01	2.0887
4.09E-01	2.0117	3.86E-01	1.9455
4.59E-01	2.1539	3.36E-01	1.7974
5.09E-01	2.2915	2.86E-01	1.6366
5.59E-01	2.4166	2.36E-01	1.5172
6.09E-01	2.5614	1.86E-01	1.3901
6.59E-01	2.7199		
7.09E-01	2.9102		
7.59E-01	3.1104		
8.09E-01	3.4170		
8.59E-01	3.8665		
9.08E-01	4.7176		
9.54E-01	7.3008		
9.99E-01	35.6307		

Table B.2 Nitrogen adsorption-desorption data of CeO_2 prepared by ELM method.

Adsorption		**Desorption**	
P/P_0	**Volume of N_2 adsorb @STP (cc/g)**	**P/P_0**	**Volume of N_2 adsorb @STP (cc/g)**
5.11E-02	2.2177	9.97E-01	43.6806
7.77E-02	2.3535	9.48E-01	14.6165
1.03E-01	2.4633	8.98E-01	8.6993
1.28E-01	2.5652	8.49E-01	7.2210
1.53E-01	2.6555	7.99E-01	6.1629
1.78E-01	2.7441	7.48E-01	5.3618
2.03E-01	2.8231	6.98E-01	4.8167
2.28E-01	2.9103	6.48E-01	4.3548
2.53E-01	3.0045	5.98E-01	3.9816
3.03E-01	3.1520	5.48E-01	3.7835
3.52E-01	3.2932	4.98E-01	3.6588
4.02E-01	3.4101	4.48E-01	3.5390
4.52E-01	3.5550	3.98E-01	3.3955
5.02E-01	3.6738	3.47E-01	3.2749
5.52E-01	3.7990	2.97E-01	3.1328
6.02E-01	4.0033	2.47E-01	2.9796
6.52E-01	4.2016	1.97E-01	2.8024
7.02E-01	4.4988	1.47E-01	2.6324
7.52E-01	4.8845	9.72E-02	2.4360
8.02E-01	5.4700	3.94E-02	2.1564
8.52E-01	6.2892		
9.01E-01	7.5485		
9.26E-01	8.4990		
9.51E-01	10.0947		
9.75E-01	14.9361		
9.97E-01	43.6806		

Table B.3 Nitrogen adsorption-desorption data of CeO_2 prepared by CEAs method.

Adsorption		**Desorption**	
P/P_0	**Volume of N_2 adsorb @STP (cc/g)**	**P/P_0**	**Volume of N_2 adsorb @STP (cc/g)**
6.11E-02	0.3735	9.99E-01	12.8194
8.69E-02	0.4007	9.47E-02	5.9624
1.12E-01	0.4396	8.91E-01	2.7510
1.62E-01	0.5047	8.41E-01	1.7369
2.12E-01	0.5740	7.90E-01	1.2948
2.62E-01	0.6400	7.39E-01	1.0495
3.12E-01	0.6949	6.89E-01	0.9376
4.11E-01	0.7359	6.39E-01	0.9113
4.61E-01	0.7755	5.89E-01	0.8761
5.12E-01	0.8109	5.39E-01	0.8488
5.61E-01	0.8391	4.89E-01	0.8261
6.12E-01	0.8572	4.38E-01	0.7945
6.61E-01	0.8922	3.88E-01	0.7571
7.11E-01	0.9271	3.38E-01	0.7168
7.61E-01	0.9461	2.88E-01	0.6693
8.11E-01	0.9734	2.38E-01	0.6092
8.61E-01	1.0486	1.88E-01	0.5417
9.10E-01	1.1587	1.38E-01	0.4740
9.55E-01	3.4654	8.82E-02	0.4026
9.99E-01	12.8194	4.15E-02	0.3529

Table B.4 Nitrogen adsorption-desorption data of CeO_2-ZrO_2 prepared by CEAs method.

Adsorption		**Desorption**	
P/P_0	**Volume of N_2 adsorb @STP (cc/g)**	**P/P_0**	**Volume of N_2 adsorb @STP (cc/g)**
3.53E-05	1.2015	9.28E-02	7.3857
1.88E-04	1.6297	1.03E-01	7.7775
5.12E-03	3.3868	1.52E-01	9.5895
1.27E-02	3.6620	2.01E-01	11.4370
2.28E-02	4.2508	2.51E-01	13.2472
3.28E-02	4.8388	3.01E-01	15.0056
4.28E-02	5.3024	4.03E-01	18.4541
5.28E-02	5.7576	5.03E-01	21.7898
6.28E-02	6.1588	6.03E-01	25.1789
7.28E-02	6.5909	7.03E-01	28.9469
7.80E-02	6.8031	8.02E-01	34.0247
8.30E-02	6.9453	9.02E-01	49.0828
9.28E-02	7.3857	9.95E-01	80.3263
		9.00E-01	70.3950
		7.96E-01	38.6966
		6.99E-01	29.4743
		5.98E-01	25.0363
		4.98E-01	21.6378
		3.98E-01	18.2880
		2.98E-01	14.8901
		1.98E-01	11.3007
		9.76E-02	7.5749

Table B.5 Nitrogen adsorption-desorption data of CeO_2-ZrO_2 prepared by CEAs method.

Adsorption		**Desorption**	
P/P_0	**Volume of N_2 adsorb @STP (cc/g)**	**P/P_0**	**Volume of N_2 adsorb @STP (cc/g)**
1.28E-02	28.9477	9.98E-01	116.8293
3.09E-02	31.1143	9.49E-01	110.9207
5.11E-02	32.8121	8.98E-01	110.1786
7.60E-02	34.5931	8.47E-01	109.7207
1.01E-01	36.2528	7.97E-01	109.3459
1.50E-01	39.3656	7.47E-01	108.9477
2.00E-01	42.5300	6.98E-01	108.3633
2.51E-01	45.8724	6.47E-01	106.1101
3.01E-01	49.2463	6.00E-01	99.4199
3.51E-01	52.8724	5.47E-01	86.5792
4.00E-01	56.7792	4.97E-01	73.7148
4.50E-01	61.1197	4.46E-01	61.5318
5.00E-01	66.2144	4.01E-01	56.5616
5.49E-01	71.8601	3.48E-01	52.4735
6.02E-01	78.7885	2.97E-01	48.8232
6.51E-01	86.1026	2.47E-01	45.4431
7.01E-01	93.8388	1.97E-01	42.1952
7.51E-01	101.2176	1.47E-01	39.0329
8.00E-01	106.4706	9.64E-02	35.8711
8.51E-01	109.2192	4.65E-02	32.3817
9.01E-01	110.2051		
9.51E-01	110.9764		
9.98E-01	116.8293		

Table B.6 Nitrogen adsorption-desorption data of Ni/CeO_2-ZrO_2 prepared by CEAs method.

Adsorption		Desorption	
P/P_0	**Volume of N_2 adsorb @STP (cc/g)**	**P/P_0**	**Volume of N_2 adsorb @STP (cc/g)**
1.28E-04	1.0571	9.29E-02	5.2322
5.36E-04	1.1394	1.03E-01	5.4455
1.01E-03	1.7978	1.52E-01	6.3508
5.12E-03	2.4775	2.02E-01	7.2969
1.27E-02	2.9629	0.25199	8.1486
2.27E-02	3.3838	3.02E-01	8.9907
3.28E-02	3.7316	4.00E-01	10.4141
4.28E-02	4.0468	5.00E-01	11.7960
5.28E-02	4.3466	5.99E-01	13.2521
6.29E-02	4.5528	7.03E-01	14.9990
7.29E-02	4.7949	8.03E-01	17.4448
7.79E-02	4.8964	9.01E-01	25.3071
8.30E-02	4.9707	9.97E-01	70.7557
9.29E-02	5.2322	8.99E-01	40.5839
		7.95E-01	19.6811
		6.98E-01	15.2325
		5.98E-01	13.2325
		4.98E-01	11.7668
		3.98E-01	10.3749
		2.98E-01	8.9179
		1.98E-01	7.2086
		9.74E-02	5.3272

B.2 Pore Size Distribution Data

Table B.7 Pore size distribution data of CeO_2 prepared by CEAs method.

BJH desorption pore size distribution			
Diameter (Å)	**Dv(d) (cc/Å/g)**	**Diameter (Å)**	**Dv(d) (cc/Å/g)**
9.34	0.00E+00	37.34	2.49E-03
10.88	0.00E+00	41.59	1.95E-04
13.36	0.00E+00	47.11	8.01E-05
16.16	0.00E+00	53.90	3.41E-05
18.65	0.00E+00	62.52	1.98E-05
21.12	0.00E+00	73.93	1.37E-05
23.71	0.00E+00	89.95	7.97E-06
26.49	0.00E+00	114.35	6.23E-06
29.57	0.00E+00	157.20	4.90E-06
33.38	0.00E+00	285.24	3.12E-06

Table B.8 Pore size distribution data of CeO_2-ZrO_2 prepared by CEAs method.

BJH desorption pore size distribution			
Diameter (Å)	**Dv(d) (cc/Å/g)**	**Diameter (Å)**	**Dv(d) (cc/Å/g)**
11.58	0.00E+00	42.87	7.02E-03
13.52	0.00E+00	48.78	5.00E-03
14.8	0.00E+00	55.95	2.02E-03
16.64	2.14E-04	64.81	4.19E-04
19.12	9.39E-04	76.56	8.52E-05
21.63	1.59E-03	93.77	3.84E-05
24.28	1.65E-03	120.74	2.05E-05
27.17	1.94E-03	169.74	1.11E-05
30.29	2.10E-03	291.85	5.34E-06
33.89	4.14E-03	606.04	2.79E-06
37.96	9.46E-03		

Table B.9 Pore size distribution data of Ni/CeO_2 prepared by CEAs method.

BJH desorption pore size distribution			
Diameter (Å)	**Dv(d) (cc/Å/g)**	**Diameter (Å)**	**Dv(d) (cc/Å/g)**
13.99	0.00E+00	42.59	7.18E-03
16.66	5.88E-05	48.55	5.49E-03
19.13	7.80E-04	55.70	2.47E-03
21.63	1.20E-03	64.64	5.73E-04
24.27	1.44E-03	76.76	9.82E-05
27.14	1.67E-03	93.99	4.18E-05
30.39	1.82E-03	120.90	2.28E-05
33.85	3.06E-03	170.37	1.35E-05
37.78	7.91E-03	299.32	7.00E-06

Table B.10 Pore size distribution data of Ni/CeO_2-ZrO_2 prepared by CEAs method.

BJH desorption pore size distribution			
Diameter (Å)	**Dv(d) (cc/Å/g)**	**Diameter (Å)**	**Dv(d) (cc/Å/g)**
11.48	0.00E+00	42.51	5.42E-03
13.47	0.00E+00	48.56	5.51E-03
14.76	0.00E+00	56.02	2.28E-03
16.61	3.48E-04	64.78	5.07E-04
19.09	1.09E-03	76.33	9.09E-05
21.6	1.55E-03	93.29	3.74E-05
24.25	1.87E-03	119.84	1.95E-05
27.16	2.02E-03	167.9	1.21E-05
30.45	2.35E-03	289.09	6.79E-06
33.88	4.18E-03	560.86	3.96E-06
37.7	8.92E-03		