Electronic Supplementary Information

Synthesis of carbon nanotubes by microwave heating 4: Influence of diameter of catalytic Ni nanoparticles on diameter of CNTs

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Table S1 The observed values of outer diameter of CNT (D_{CNT}), inner diameter of CNT (**r**), wall thickness (**L**), the number of graphene layers (**n**), and the calculated value of thickeness of a graphene (**l = L/n**) depending on the calcintion conditions of heating temperature (°C) and time (min) with Ni nanoparticle size (D_{Ni})

Sample No.	Condition		D_{Ni}(nm)	D_{CNT}(nm)	r(nm)	L(nm)	n	l(nm)
	Temp (°C)	Time (min)						
1	800	10	90	115	15.8	53.5	157	0.340
2	800	10	90	100	12.6	55.4	150	0.369
3	800	10	90	105	14.7	31.5	100	0.315
4	800	10	90	124	20.0	58.9	151	0.390
5	800	10	90	92.6	14.7	57.0	155	0.368
6	800	10	90	120	11.4	39.5	118	0.335
7	800	10	90	-	-	51.7	144	0.359
8	800	10	90	-	-	57.9	156	0.371
9	800	10	50	63.2	10.5	26.3	74	0.355
10	800	10	50	63.1	15.2	18.9	55	0.344
11	800	10	50	41.1	10.5	15.3	43	0.355
12	800	10	50	68.4	15.7	25.0	75	0.333
13	800	10	50	46.8	8.42	19.5	55	0.354
14	800	10	50	67.3	14.2	26.8	75	0.357
15	800	10	50	-	-	17.9	55	0.325
16	800	10	50	-	-	22.8	66	0.346
17	800	10	20	25.0	11.3	6.10	17	0.359
18	800	10	20	42.1	15.7	11.0	29	0.379
19	800	10	20	31.5	12.8	9.20	25	0.368
20	800	10	20	42.1	17.8	11.9	29	0.410
21	800	10	20	34.7	11.5	16.3	40	0.408
22	800	10	20	41.1	12.6	8.68	26	0.334
23	800	10	20	-	-	13.1	35	0.374
24	800	10	20	-	-	8.69	23	0.378
25	800	10	10	32.6	11.3	8.68	25	0.347
26	800	10	10	32.8	12.1	10.0	28	0.357
27	800	10	10	27.3	7.37	9.46	26	0.364
28	800	10	10	15.3	5.26	5.27	15	0.351
29	800	10	10	30.0	9.57	9.13	27	0.338
30	800	10	10	27.6	8.95	8.42	23	0.366
31	800	10	10	-	-	8.42	23	0.366
32	800	10	10	-	-	9.20	25	0.368
33	700	15	90	144	13.9	33.7	93	0.362
34	700	15	90	117	13.9	36.8	100	0.368
35	700	15	90	111	16.6	32.0	90	0.356
36	700	15	90	138	22.2	25.4	73	0.348
37	700	15	90	123	17.9	25.9	73	0.355
38	700	15	90	73.7	21.1	31.8	91	0.349
39	700	15	90	-	-	35.5	100	0.355
40	700	15	90	-	-	28.1	90	0.312

Table. S1 (continued)

41	700	15	50	52.8	13.7	17.4	50	0.348
42	700	15	50	51.3	26.6	12.0	35	0.343
43	700	15	50	36.0	11.1	11.8	35	0.338
44	700	15	50	34.2	8.57	13.2	38	0.348
45	700	15	50	55.4	16.6	9.58	28	0.342
46	700	15	50	46.6	17.3	17.5	50	0.350
47	700	15	50	-	-	12.0	35	0.343
48	700	15	50	-	-	19.1	55	0.348
49	700	15	20	34.3	13.2	7.50	22	0.341
50	700	15	20	21.4	7.50	7.87	23	0.342
51	700	15	20	25.0	10.7	8.25	25	0.330
52	700	15	20	16.6	3.73	6.43	18	0.357
53	700	15	20	32.8	19.2	9.28	26	0.357
54	700	15	20	28.3	6.25	7.15	22	0.325
55	700	15	20	-	-	10.4	29	0.357
56	700	15	20	-	-	7.84	22	0.357
57	700	15	10	38.5	8.00	13.5	33	0.409
58	700	15	10	28.9	8.94	10.5	26	0.404
59	700	15	10	30.0	6.00	11.2	28	0.401
60	700	15	10	26.8	10.7	9.48	27	0.351
61	700	15	10	25.0	7.50	10.5	25	0.421
62	700	15	10	37.5	20.0	12.0	29	0.413
63	700	15	10	-	-	9.25	25	0.370
64	700	15	10	-	-	8.28	23	0.360

- : not measurable

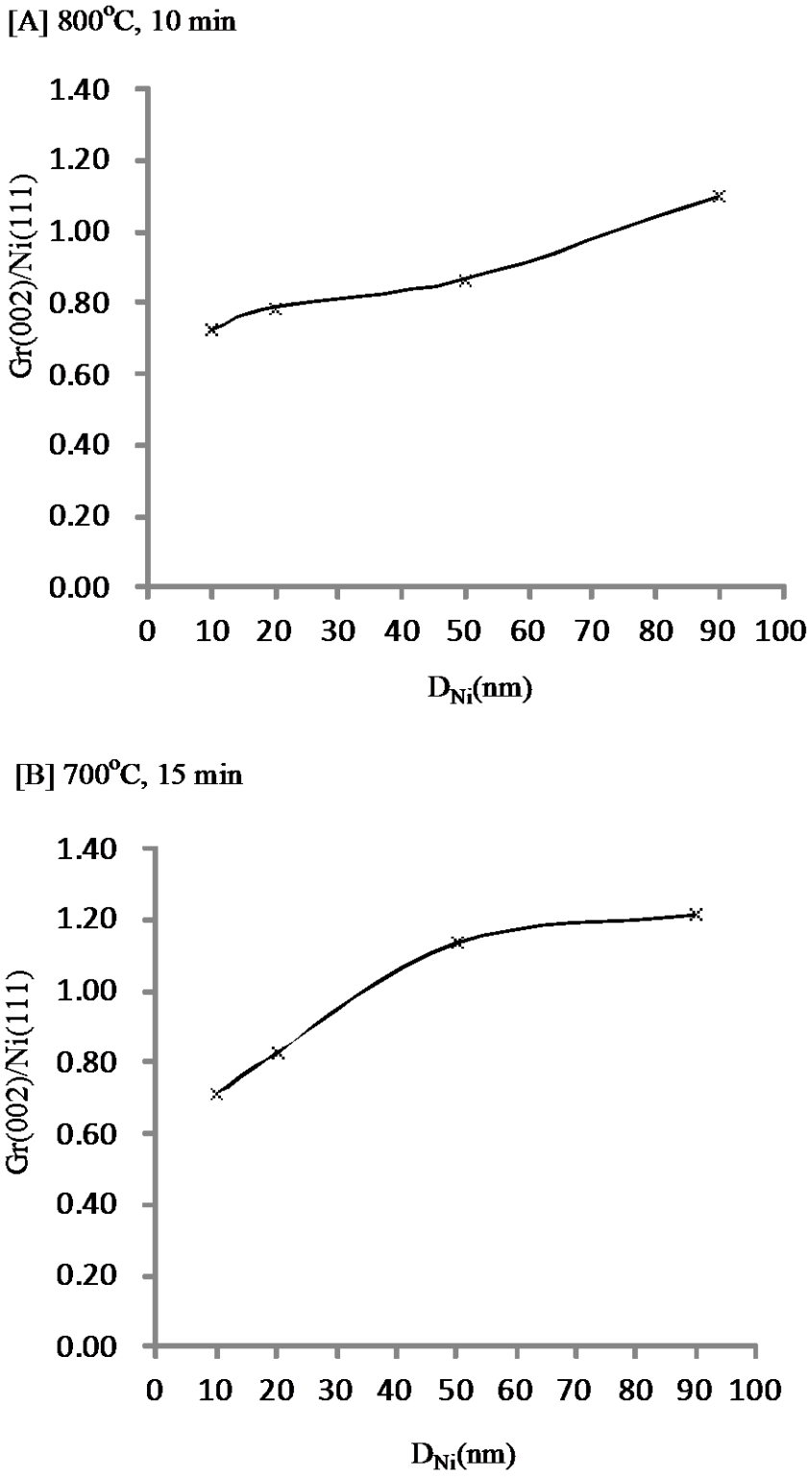

Fig.S1 **Gr(002)/Ni(111)** ratio of the carbon products versus diameter of the Ni nanoparticles (D_{Ni}): [A] 800°C, 10 min, [B] 700°C, 15 min. The data correspond to the XRD patterns in Fig.10.

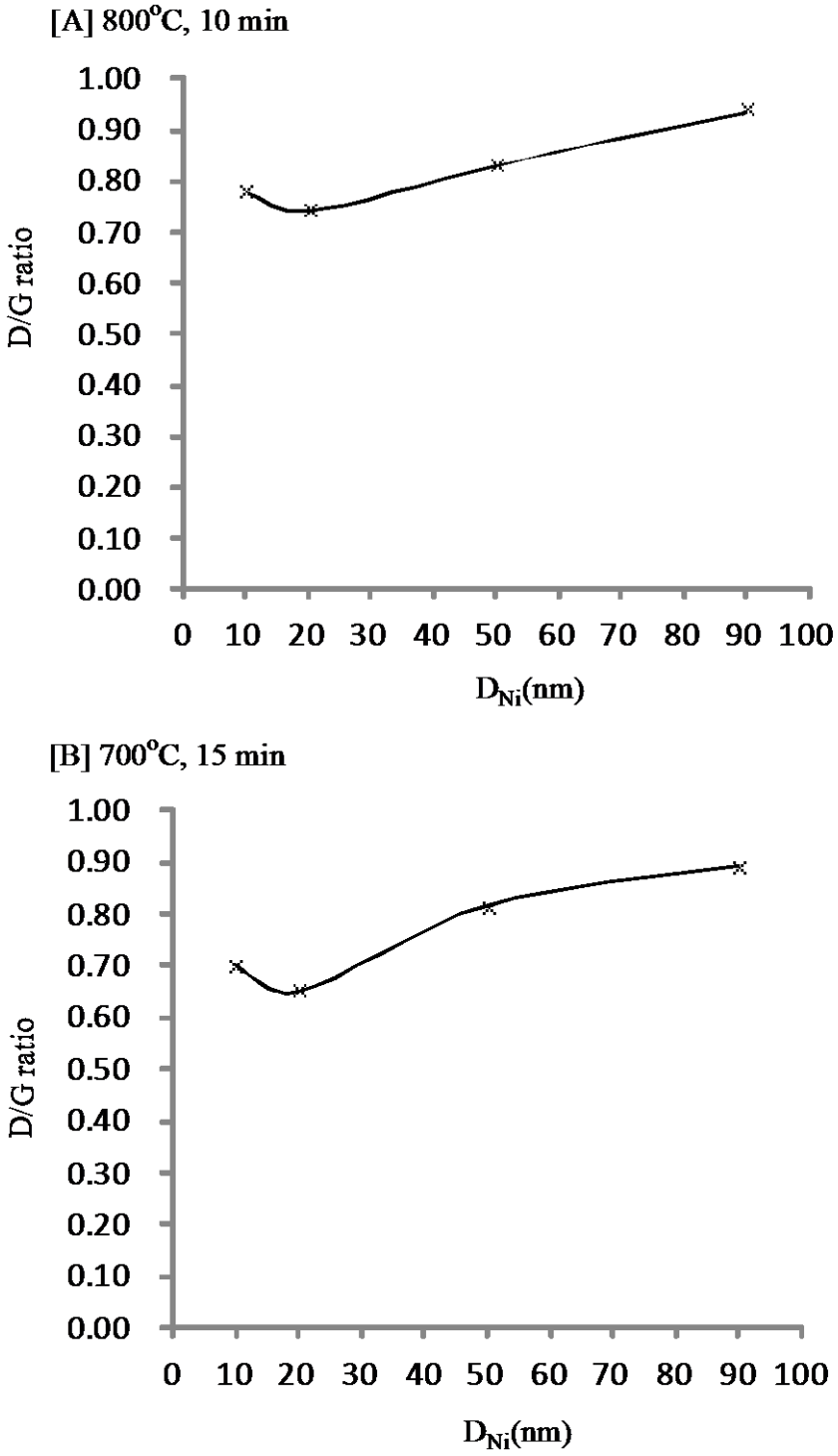

Fig. S2. D/G ratio of the carbon products versus diameter of the Ni nanoparticles (D_{Ni}): [A] 800°C, 10 min, [B] 700°C, 15 min. The data correspond to the Raman spectra in Fig.11.

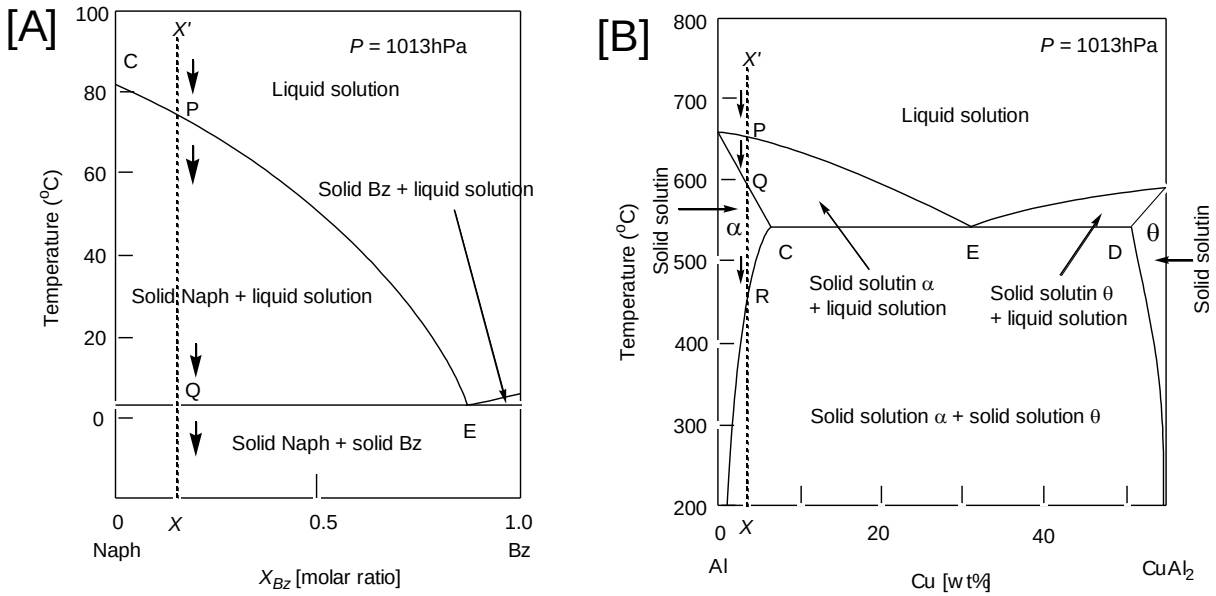

Fig.S3. Temperature-composition (T-X) diagrams. [A] T-X diagram of naphthalene and benzene. Solids of naphthalene and benzene are not soluble for each other, so that no solid solutions are formed. On cooling the liquid solution from Point X', recrystallization of naphthalene begins to take place at Point P. On further cooling, the liquid solution completely disappears at Point Q and a mixture of solid naphthalene and solid benzene begins to form. [B] A part of T-X diagram of aluminium and copper. Solids of aluminium and copper are partially soluble for each other, so that the solid solutions α and θ are formed. On cooling the liquid solution from Point X', recrystallization of solid solution α begins to take place at Point P and liquid solution completely disappears at Point Q. On further cooling, phase separation begins at Point R to form a mixture of the solid solutions α and θ.