1. Solubility parameter analysis

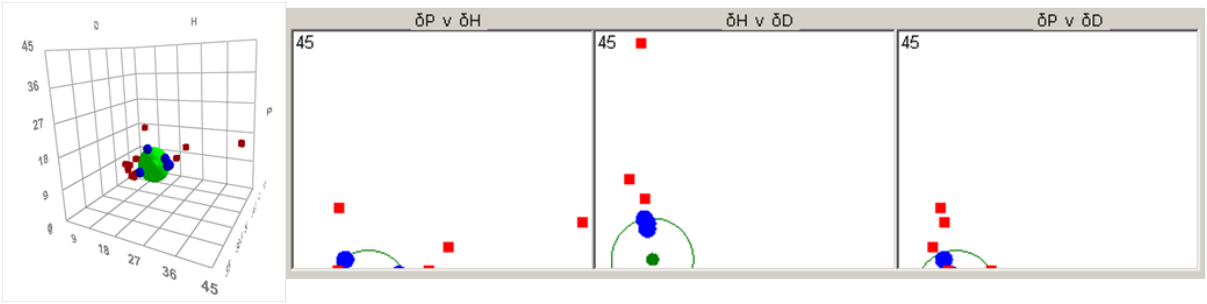

Figure S 1. Hansen solubility diagrams for ZnO nanoparticles and selected solvents. Solvents in blue are considered to be good solvent while solvents in red are poor solvents.

30mg of ZnO nanoparticles were dispersed in 1.5ml of various solvents by sonication for 3 hours. After dispersion, the colloidal solution were centrifuged at speed of 8000rpm for 5 minutes which corresponds to acceleration of 3500G. 1ml of supernatant after centrifugation were sampled and dried under vacuum at room temparature for 2 hours. Residues were further dried in vacuum oven at 120°C for 12 hours and dissolved with 1ml of high purity nitric acid for further characterization with induction coupled plasma-mass spectrometry (ICP-MS). Thus, the solubility or dispersibility of ZnO nanoparticles in 20 different solvents was obtained from the concentration measured from ICP-MS. In this study, solubility of 1mg/ml was used as a criterion for dispersion. That is, the score of the solvent having solubility of ZnO NPs higher than 1mg/ml was set to "1" and otherwise "0". These data were used as input information for calculating Hansen solubility parameters for ZnO nanoparticles using HSPiP, a software developed by C. M. Hansen and colleagues [http://www.hansen-solubility.com/]. Dispersion score and calculated relative energy difference (RED) of ZnO nanoparticles in various solvent was listed in table S1. Following this procedure, the solubility parameters of ZnO nanoparticles were measured to be δ_D = 17.25MPa$^{1/2}$, δ_P = 6.75 MPa$^{1/2}$ and δ_H = 10.83 MPa$^{1/2}$ with the interaction radius of R_o = 6.7 MPa$^{1/2}$

Table S1. Hansen solubility parameters for various solvents and RED of ZnO NPs calculated in this study

Name		Solubility parameters			Score	RED
		D	P	H		
1	2-methoxyethanol	16	8.2	15	1	0.863
2	Isopropyl alcohol	15.8	6.1	16.4	1	0.998
3	Chloroform	17.8	3.1	5.7	1	0.999
4	1-Butanol	16	5.7	15.8	1	0.888
5	Acetone	15.5	10.4	7	1	0.999
6	Octane	15.5	0	0	0	1.971
7	Ethanol	15.8	8.8	19.4	0	1.567
8	Pyridine	19	8.8	5.9	1	1.244
9	Hexane	14.9	0	0	0	2.01
10	Toluene	18	1.4	2	0	1.64
11	Tetrachloroethylene	18.3	5.7	0	0	1.823
12	Methanol	14.7	12.3	22.3	0	2.293
13	Chlorobenzene	19	4.3	2	0	1.643
14	Tetrahydrofuran (THF)	16.8	5.7	8	1	0.395
15	o-Xylene	17.8	1	3.1	0	1.501
16	o-Dichlorobenzene	19.2	6.3	3.3	0	1.493
17	Acetonitrile	15.3	18	6.1	0	2.169
18	1-Octanol	16	5	11.2	1	0.449
19	N,N-Diethyl Formamide	16.4	11.4	9.2	1	0.694
20	1,2,4-Trichlorobenzene	20.2	4.2	3.2	0	1.585

2. Dispersion of ZnO nanoparticles in isopropyl alcohol-chlorobenzene co-solvent

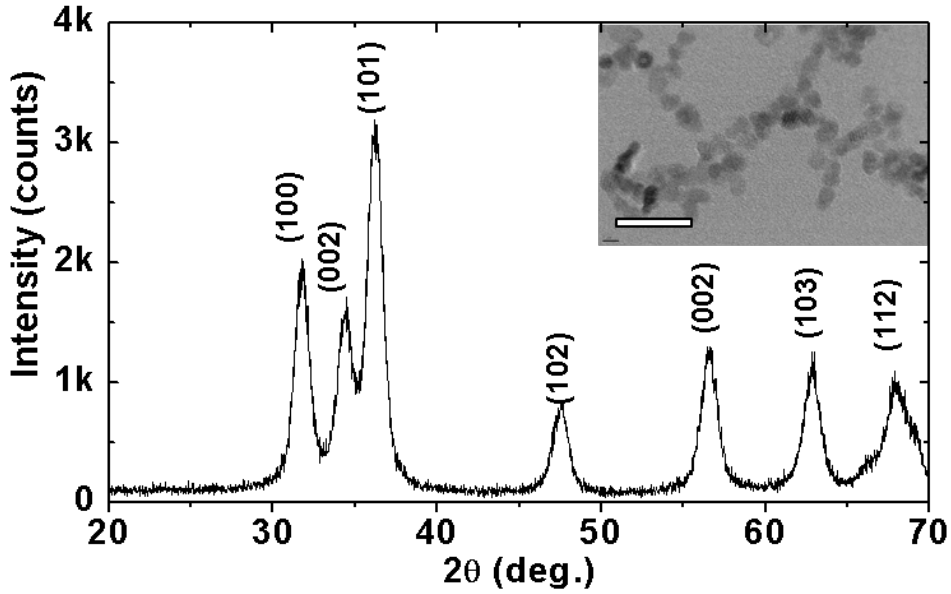

Figure S 2. Powder X-ray diffraction profile of ZnO nanoparticles. Inset is their TEM image (scale bar=20nm).

The crystal structure grown ZnO nanoparticles was investigated with X-ray diffraction and Wurzite structure was detected without any other phase. The size of ZnO nanoparticles is measured to be *ca*. 4nm as shown from TEM image in Fig. S2.

3. Contact angle of various solvents on ITO substrates

In order to characterize the effect of solvent wetting for ZnO film formation, we measured the contact angle of various solvents on ITO substrates including both pure and mixed solvents. Both pure solvent and mixed solvent showed very low contact angle as shown in Fig.S3. Then, the effect of solvent wetting on morphology of ZnO film seems to be trivial in CB-IPA binary solvent system.

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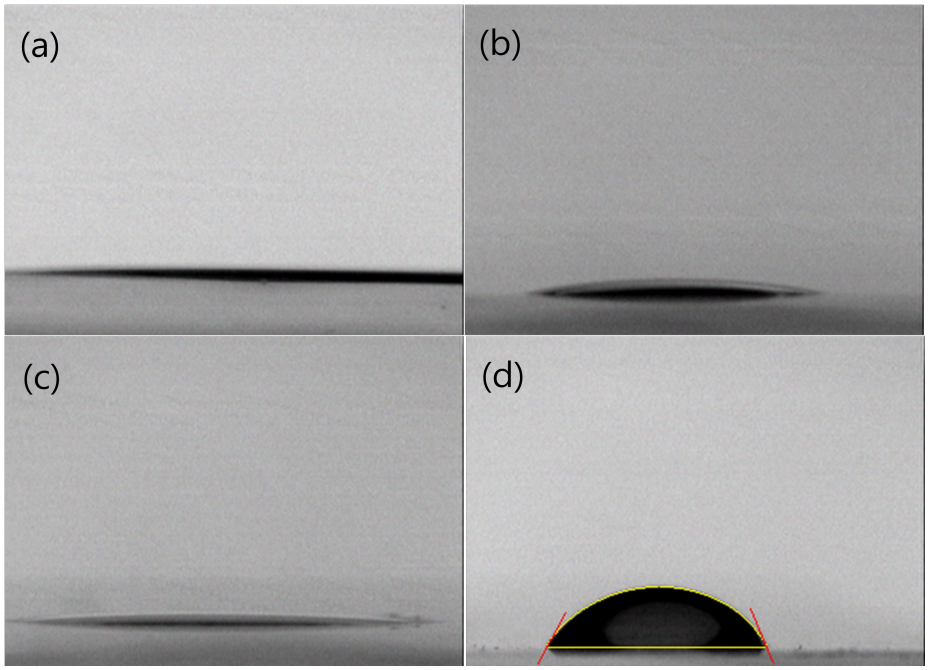

Figure S 3. Contact angle of various solvents on ITO glass substrate: (a) chlorobenzene, (b) chlorobenzene-isopropyl alcohol mixture, (c) isopropyl alcohol, (d) water.