Supplementary Information

Table S1. Success rate (SR) and NFE of MCSS, FA and CS for solving phase stability problems using SC-2.

Table S2. Success rate (SR) and NFE of CMCSSPSO, FA and CS for solving phase equilibrium problems using SC-2.

Table S3. Success rate (SR) and NFE of CMCSSPSO, FA and CS for solving reactive phase equilibrium problems using SC-2.

Table S1.

		MCSS		CS		FA	
No.	SC-2	SR	NFE	SR	NFE	SR	NFE
P_S-1	10	**59**	985	30	551	51	517
	25	**71**	2936	**71**	1911	66	1094
	50	84	9289	**88**	4230	79	1988
P_S-2	10	**96**	3021	31	1283	57	1087
	25	**100**	6871	42	4418	32	2083
	50	**100**	18259	64	10038	21	3665
P_S-3	10	**100**	1830	**100**	609	**100**	712
	25	99	3931	**100**	1607	**100**	1701
	50	**100**	10731	**100**	3091	**100**	3191
P_S-4	10	99	873	97	657	**100**	442
	25	99	2208	97	2036	**100**	1046
	50	99	8258	**100**	4001	**100**	2158
P_S-5	10	**77**	4135	8	1513	60	1382
	25	**74**	11766	24	3849	57	3179
	50	**91**	33175	80	15168	38	5902
P_S-6	10	**56**	8968	38	3810	30	2562
	25	73	44224	**77**	18282	36	5482
	50	82	97799	**97**	70358	43	13659
P_S-7	10	96	11323	**99**	7156	**99**	4536
	25	96	35836	**98**	35251	97	9690
	50	98	107365	**100**	89889	98	18967
P_S-8	10	**68**	10089	6	4589	53	3243
	25	**67**	23897	2	6880	60	7127
	50	**65**	88578	22	20565	61	18158
Average GSR and Total NFE		**85**	546347	66	311742	68	113569

Table S2.

		CMCSSPSO		CS		FA	
No.	SC-2	SR	NFE	SR	NFE	SR	NFE
P_E-1	10	52	736	**91**	849	51	499
	25	87	2703	**100**	2783	82	1127
	50	99	8822	**100**	7743	93	2068
P_E-2	10	36	1439	**43**	1306	4	829
	25	36	4072	**98**	6450	0	1832
	50	71	14985	**100**	15885	0	3449
P_E-3	10	**100**	1383	**100**	1207	**100**	677
	25	**100**	5061	**100**	5455	**100**	1515
	50	**100**	16641	**100**	14453	**100**	3339
P_E-4	10	**83**	726	65	549	55	463
	25	**94**	3074	92	3126	86	1187
	50	98	10822	**99**	7221	97	2533
P_E-5	10	92	3042	**100**	1950	95	1890
	25	90	8249	**100**	4747	97	3337
	50	95	25155	**100**	13697	89	5887
P_E-6	10	99	5271	99	4640	**100**	2856
	25	**100**	16817	89	18744	**100**	5462
	50	99	70959	99	54586	**100**	10323
P_E-7	10	**100**	4802	**100**	5288	**100**	3077
	25	**100**	15237	**100**	26393	**100**	7047
	50	**100**	50896	**100**	106439	**100**	17608
P_E-8	10	**100**	5123	97	6302	**100**	3455
	25	**100**	16972	93	31931	**100**	6409
	50	**100**	80909	93	61646	**100**	15100
Average GSR and Total NFE		89	373896	**94**	403389	81.2	101974

Table S3.

		CMCSSPSO		CS		FA	
No.	SC-2	SR	NFE	SR	NFE	SR	NFE
P_{RE}-1	6	**100**	2158	**100**	1265	**100**	1268
	12	**100**	4142	**100**	3076	**100**	1987
	24	**100**	7884	**100**	11218	**100**	3414
P_{RE}-2	6	**100**	2278	**100**	1306	**100**	1201
	12	**100**	4243	**100**	3576	**100**	1950
	24	99	8776	**100**	18175	**100**	3484
P_{RE}-3	6	**100**	2218	**100**	1322	**100**	1325
	12	**100**	4203	**100**	2849	99	1986
	24	**100**	8666	**100**	7380	**100**	3486
P_{RE}-4	6	0	1805	**1**	1221	0	1226
	12	1	3501	**7**	2732	0	1961
	24	0	7846	**40**	7689	0	3234
P_{RE}-5	6	**99**	1334	92	954	95	877
	12	**95**	2618	84	2410	**95**	1368
	24	90	6470	**99**	6632	89	2332
P_{RE}-6	6	87	2579	89	1942	**92**	1554
	12	89	4700	**95**	5158	92	2403
	24	93	10622	**99**	26227	92	4012
P_{RE}-7	6	13	1482	**19**	865	9	997
	12	15	2765	**33**	2358	11	1505
	24	15	5083	**80**	6942	13	2607
P_{RE}-8	6	**100**	2036	**100**	1229	99	1209
	12	**100**	3717	**100**	3415	**100**	1854
	24	**100**	7627	**100**	13029	**100**	3080
Average GSR and Total NFE		75	108753	**81**	132970	74.4	50317