Supplementary Materials

The Effect of Temperature on the London Dispersive and Lewis Acid-base Surface Energies of Poly Methyl Methacrylate Adsorbed on Silica by Inverse Gas Chromatography

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Table S1. Values of $RTlnVn$ (kJ/mol) of n-alkanes adsorbed on silica particles as a function of the temperature

T(K)	C5	C6	C7	C8	C9
303.15	10.500	14.699	18.816	23.029	27.189
313.15	9.135	13.187	17.142	21.189	25.177
323.15	7.814	11.689	15.451	19.299	23.080
328.15	7.256	10.940	14.602	18.348	22.022
333.15	6.393	10.127	13.731	17.415	21.025
338.15	5.880	9.534	13.048	16.808	20.026
343.15	5.514	9.109	12.555	16.076	19.515
348.15	5.088	8.616	11.985	15.424	18.779
353.15	4.683	8.165	11.476	14.854	18.144
363.15	3.576	6.937	10.102	13.326	16.454
373.15	2.643	5.853	8.838	11.875	14.802
378.15	2.361	5.540	8.477	11.458	14.330
383.15	1.829	4.977	7.861	10.784	13.594
388.15	1.315	4.336	7.169	10.035	12.784
393.15	0.853	3.919	6.673	9.564	12.112
398.15	0.685	3.741	6.453	9.184	11.786
403.15	-0.065	2.992	5.667	8.352	10.904
408.15	-0.621	2.426	5.045	7.666	10.147
413.15	-0.901	2.152	4.721	7.281	9.695
423.15	-1.453	1.697	4.189	6.645	8.940

433.15	-2.915	1.662	4.108	6.153	7.834
443.15		0.824	3.171	5.296	7.225
453.15		0.148	2.554	4.641	6.503
463.15		-0.465	2.159	4.257	6.083
473.15			1.947	4.117	5.781

Table S2. Values of parameter $2\mathcal{N}a\left(\gamma_l^d\right)^{1/2}$ $(m^2 \times mJ^{1/2})$ of n-alkanes adsorbed on solid particles as a function of the temperature

T(K)	C5	C6	C7	C8	C9
303.15	2.084	2.496	2.860	3.262	3.634
313.15	2.023	2.440	2.806	3.209	3.580
323.15	1.957	2.381	2.750	3.152	3.523
328.15	1.922	2.350	2.720	3.123	3.494
333.15	1.886	2.318	2.689	3.093	3.463
338.15	1.848	2.284	2.658	3.062	3.432
343.15	1.809	2.250	2.626	3.030	3.400
348.15	1.768	2.214	2.592	2.997	3.367
353.15	1.726	2.178	2.558	2.963	3.333
363.15	1.635	2.100	2.486	2.893	3.263
373.15	1.535	2.017	2.409	2.818	3.189
378.15	1.481	1.973	2.369	2.779	3.151
383.15	1.424	1.927	2.327	2.739	3.111
388.15	1.364	1.879	2.284	2.698	3.071
393.15	1.299	1.829	2.240	2.655	3.029
398.15	1.231	1.777	2.193	2.611	2.986
403.15	1.157	1.723	2.145	2.565	2.941
408.15	1.076	1.665	2.096	2.518	2.895
413.15	0.988	1.605	2.044	2.469	2.848
423.15	0.776	1.474	1.933	2.367	2.750
433.15	0.464	1.326	1.813	2.256	2.644
443.15		1.153	1.680	2.137	2.531
453.15		0.943	1.530	2.006	2.410
463.15		0.661	1.360	1.863	2.278
473.15			1.160	1.703	2.135

Table S3. Values of the transition temperatures of PMMA adsorbed on silica particles at different recovery fractions.

Recovery fraction of PMMA/silica θ	Beta-relaxation temperature T_β $(in\ K)$	Glass transition temperature T_g $(in\ K)$	Liquid-liquid temperature T_{l-l} $(in\ K)$
0.31	333.15	383.15	433.15
0.54	343.15	398.15	443.15
0.83	338.15	393.15	433.15
0.98	333.15	383.15	443.15
1.0	333.15	383.15	443.15
PMMA	333.15	388.15	433.15

Table S4. Variations of $\Delta G_a^{sp}(T)$ (kJ/mol) of dichloromethane adsorbed on silica particles and PMMA/silica as a function of the temperature, at different recovery fractions. $\theta = 0$ $(silica\ case)$, $\theta = 0.31$, $\theta = 0.83$, $\theta = 1.0$, and $\theta \gg 1$ $(PMMA\ case)$.

T(K)	θ = 0 (Silica case)	θ = 0.31	θ = 0.83	θ = 1.0	θ >> 1 (PMMA case)
303.15	25.241	20.777	27.605	36.031	18.520
313.15	24.896	19.604	25.780	31.827	16.940
323.15	24.807	18.973	24.330	27.832	16.034
328.15	24.379	18.169	24.125	26.052	15.902
333.15	24.206	18.442	24.143	25.107	17.105
338.15	24.034	18.608	24.970	23.004	14.792
343.15	23.876	19.382	23.919	22.303	15.055
348.15	23.689	18.336	23.804	23.918	15.178
353.15	23.516	18.364	23.752	24.387	14.911
363.15	23.102	18.115	22.566	24.438	13.717
373.15	22.826	17.019	21.338	23.218	12.279
378.15	22.654	17.200	21.114	23.350	13.019
383.15	22.285	16.865	21.872	25.912	14.521
388.15	22.309	17.412	23.872	28.129	10.832
393.15	22.136	18.243	22.237	25.838	12.707
398.15	21.964	19.648	21.453	22.887	12.170
403.15	21.689	21.423	21.428	18.964	11.776
408.15	21.619	19.980	20.973	18.878	11.631
413.15	21.446	18.756	20.481	19.192	11.135
423.15	21.206	17.133	20.132	19.875	11.458
433.15	20.756	16.598	21.753	17.697	13.574
443.15	20.411	21.255	19.670	14.849	10.220
453.15	20.066	18.117	19.017	15.433	9.388
463.15	20.070	15.912	22.320	16.389	8.917
473.15	19.376	12.895	17.745	16.525	7.776

Table S5. Variations of $\Delta G_a^{sp}(T)$ (kJ/mol) of ethyl acetate adsorbed on silica particles and PMMA/silica as a function of the temperature, at different recovery fractions. $\theta = 0$ $(silica\ case)$, $\theta = 0.31$, $\theta = 0.83$, $\theta = 1.0$, and $\theta \gg 1$ $(PMMA\ case)$.

T(K)	θ = 0 (Silica case)	θ = 0.31	θ = 0.83	θ = 1.0	θ >> 1 (PMMA case)
303.15	17.422	14.300	20.114	21.479	16.029
313.15	17.089	12.803	18.354	20.360	14.694
323.15	16.852	12.216	16.800	18.376	14.037
328.15	16.590	11.486	16.021	17.682	14.498
333.15	16.423	11.672	15.604	17.746	15.192
338.15	16.257	11.637	16.923	17.019	13.243
343.15	16.149	11.926	16.634	16.908	13.912
348.15	15.924	10.618	16.379	17.644	14.430
353.15	15.757	10.503	16.315	17.500	14.285
363.15	15.394	9.424	14.651	16.971	13.499
373.15	15.091	7.416	12.867	15.990	12.891
378.15	14.925	7.107	12.511	16.213	13.325
383.15	14.704	6.584	13.086	18.321	14.659
388.15	14.592	6.829	14.790	20.016	11.700
393.15	14.425	7.413	12.425	17.162	10.781
398.15	14.259	8.909	9.449	15.325	12.783
403.15	14.080	8.802	11.597	14.041	13.202
408.15	13.926	7.117	11.654	13.365	13.460
413.15	13.759	7.482	11.281	13.009	13.146
423.15	13.498	7.003	11.137	13.139	13.434
433.15	13.093	7.619	12.413	14.366	15.576
443.15	12.760	11.397	10.859	12.211	13.114
453.15	12.427	11.040	10.113	12.355	12.620
463.15	12.350	9.852	12.954	12.883	12.645
473.15	11.761	8.197	7.945	12.504	11.811

Table S6. Values of $\gamma_s^+(T)$, $\gamma_s^-(T)$, $\gamma_s^{AB}(T)$, $\gamma_s^d\ (T)$, and $\gamma_s^{tot.}(T)$ of silica particles and PMMA adsorbed on silica as a function of the temperature, at different recovery fractions: $\theta = 0$ $(silica\ case)$, $\theta = 0.31$, $\theta = 0.83$, $\theta = 1.0$, and $\theta \gg 1$ $(PMMA\ case)$.

Silica, $\theta = 0$					
T(K)	$\gamma_s^-(T)$	$\gamma_s^+(T)$	$\gamma_s^{AB}(T)$	$\gamma_s^d\ (T)$	$\gamma_s^{tot.}(T)$
303.15	350.30	119.37	408.98	116.29	525.28
313.15	337.36	113.70	391.70	106.48	498.18
323.15	331.59	109.46	381.03	95.37	476.39
328.15	318.64	105.55	366.78	88.87	455.65
333.15	312.58	102.93	358.73	86.42	445.16
338.15	306.60	100.35	350.81	81.23	432.04
343.15	301.10	98.53	344.48	77.81	422.29

348.15	294.92	95.33	335.34	73.68	409.02
353.15	289.20	92.88	327.80	70.45	398.25
363.15	276.37	87.78	311.52	62.86	374.38
373.15	267.17	83.54	298.79	54.33	353.12
378.15	261.86	81.31	291.83	51.68	343.52
383.15	252.17	78.54	281.47	48.93	330.40
388.15	251.49	76.97	278.25	45.55	323.81
393.15	246.41	74.86	271.63	43.01	314.64
398.15	241.41	72.79	265.12	40.28	305.39
403.15	234.28	70.64	257.28	38.02	295.30
408.15	231.64	68.76	252.41	35.25	287.66
413.15	226.87	66.80	246.22	31.13	277.34
423.15	219.69	63.68	236.55	27.85	264.40
433.15	208.48	59.35	222.47	23.93	246.40
443.15	199.70	55.84	211.20	21.53	232.73
453.15	191.19	52.46	200.31	18.74	219.05
463.15	189.47	51.33	197.23	16.34	213.57
473.15	174.96	46.12	179.65	15.47	195.13

PMMA/Silica, $\theta = 0.31$

T(K)	$\gamma_s^-(T)$	$\gamma_s^+(T)$	$\gamma_s^{AB}(T)$	$\gamma_s^d\ (T)$	$\gamma_s^{tot.}(T)$
303.15	350.30	237.35	80.42	276.32	116.29
313.15	337.36	209.17	63.81	231.07	106.48
323.15	331.59	193.97	57.52	211.25	95.37
328.15	318.64	176.98	50.59	189.25	88.87
333.15	312.58	181.44	51.99	194.24	86.42
338.15	306.60	183.79	51.42	194.43	81.23
343.15	301.10	198.42	53.74	206.51	77.81
348.15	294.92	176.70	42.39	173.09	73.68
353.15	289.20	176.36	41.27	170.62	70.45
363.15	276.37	169.93	32.90	149.54	62.86
373.15	267.17	148.52	20.18	109.48	54.33
378.15	261.86	150.95	18.44	105.51	51.68
383.15	252.17	144.43	15.75	95.39	48.93
388.15	251.49	153.21	16.86	101.64	45.55
393.15	246.41	167.36	19.77	115.04	43.01
398.15	241.41	193.19	28.41	148.18	40.28
403.15	234.28	228.57	27.60	158.86	38.02
408.15	231.64	197.86	17.96	119.23	35.25
413.15	226.87	173.52	19.75	117.10	31.13
423.15	219.69	143.41	17.14	99.16	27.85
433.15	208.48	133.32	20.10	103.52	23.93
443.15	199.70	216.55	44.54	196.43	21.53
453.15	191.19	155.85	41.41	160.67	18.74

463.15	189.47	119.10	32.67	124.75	16.34
473.15	174.96	77.49	22.40	83.33	15.47

PMMA/Silica, $\theta = 0.83$

T(K)	$\gamma_s^-(T)$	$\gamma_s^+(T)$	$\gamma_s^{AB}(T)$	$\gamma_s^d\ (T)$	$\gamma_s^{tot.}(T)$
303.15	350.30	418.98	159.12	516.40	116.29
313.15	337.36	361.73	131.16	435.63	106.48
323.15	331.59	318.95	108.78	372.54	95.37
328.15	318.64	312.03	98.43	350.51	88.87
333.15	312.58	310.94	92.92	339.95	86.42
338.15	306.60	330.96	108.75	379.42	81.23
343.15	301.10	302.17	104.54	355.47	77.81
348.15	294.92	297.81	100.86	346.61	73.68
353.15	289.20	295.03	99.58	342.81	70.45
363.15	276.37	263.70	79.52	289.61	62.86
373.15	267.17	233.46	60.73	238.14	54.33
378.15	261.86	227.48	57.14	228.02	51.68
383.15	252.17	242.92	62.20	245.85	48.93
388.15	251.49	287.95	79.08	301.80	45.55
393.15	246.41	248.66	55.54	235.04	43.01
398.15	241.41	230.32	31.96	171.60	40.28
403.15	234.28	228.67	47.92	209.36	38.02
408.15	231.64	218.00	48.16	204.93	35.25
413.15	226.87	206.91	44.90	192.78	31.13
423.15	219.69	198.01	43.35	185.29	27.85
433.15	208.48	228.97	53.35	221.04	23.93
443.15	199.70	185.45	40.44	173.21	21.53
453.15	191.19	171.71	34.74	154.48	18.74
463.15	189.47	234.33	56.47	230.07	16.34
473.15	174.96	146.73	21.05	111.15	15.47

PMMA/Silica, $\theta = 1.0$

T(K)	$\gamma_s^-(T)$	$\gamma_s^+(T)$	$\gamma_s^{AB}(T)$	$\gamma_s^d\ (T)$	$\gamma_s^{tot.}(T)$
303.15	350.30	713.78	181.44	719.74	116.29
313.15	337.36	551.32	161.39	596.59	106.48
323.15	331.59	417.40	130.15	466.15	95.37
328.15	318.64	363.87	119.91	417.77	88.87
333.15	312.58	336.27	120.17	402.05	86.42
338.15	306.60	280.89	109.98	351.52	81.23
343.15	301.10	262.73	108.02	336.92	77.81
348.15	294.92	300.66	117.04	375.17	73.68
353.15	289.20	311.02	114.57	377.54	70.45
363.15	276.37	309.24	106.69	363.28	62.86
373.15	267.17	276.43	93.79	322.03	54.33
378.15	261.86	278.21	95.95	326.76	51.68

383.15	252.17	340.93	121.93	407.77	48.93
388.15	251.49	399.82	144.83	481.27	45.55
393.15	246.41	335.71	105.95	377.20	43.01
398.15	241.41	262.14	84.08	296.91	40.28
403.15	234.28	179.10	70.24	224.33	38.02
408.15	231.64	176.64	63.33	211.54	35.25
413.15	226.87	181.69	59.72	208.33	31.13
423.15	219.69	192.99	60.33	215.82	27.85
433.15	208.48	151.55	71.45	208.12	23.93
443.15	199.70	105.69	51.14	147.03	21.53
453.15	191.19	113.09	51.86	153.16	18.74
463.15	189.47	126.34	55.86	168.01	16.34
473.15	174.96	127.25	52.13	162.89	15.47
PMMA, $\theta \gg 1$					
T(K)	$\gamma_s^-(T)$	$\gamma_s^+(T)$	$\gamma_s^{AB}(T)$	$\gamma_s^d\ (T)$	$\gamma_s^{tot.}(T)$
303.15	350.30	188.57	101.05	276.07	116.29
313.15	337.36	156.18	84.06	229.16	106.48
323.15	331.59	138.53	75.94	205.14	95.37
328.15	318.64	135.58	80.61	209.09	88.87
333.15	312.58	156.07	88.07	234.48	86.42
338.15	306.60	116.14	66.60	175.89	81.23
343.15	301.10	119.72	73.12	187.13	77.81
348.15	294.92	121.07	78.28	194.70	73.68
353.15	289.20	116.28	76.34	188.44	70.45
363.15	276.37	97.42	67.50	162.19	62.86
373.15	267.17	77.31	60.95	137.29	54.33
378.15	261.86	86.48	64.81	149.74	51.68
383.15	252.17	107.07	78.06	182.85	48.93
388.15	251.49	59.29	49.49	108.34	45.55
393.15	246.41	81.20	41.81	116.54	43.01
398.15	241.41	74.12	58.50	131.70	40.28
403.15	234.28	69.06	62.09	130.97	38.02
408.15	231.64	67.04	64.24	131.26	35.25
413.15	226.87	61.16	60.98	122.14	31.13
423.15	219.69	64.14	63.07	127.21	27.85
433.15	208.48	89.16	84.00	173.08	23.93
443.15	199.70	50.06	58.98	108.68	21.53
453.15	191.19	41.85	54.11	95.17	18.74
463.15	189.47	37.40	53.81	89.73	16.34
473.15	174.96	28.18	46.51	72.41	15.47