Supplementary Information

1. Schematic Illustration of Apparatus Used to Measure Friction

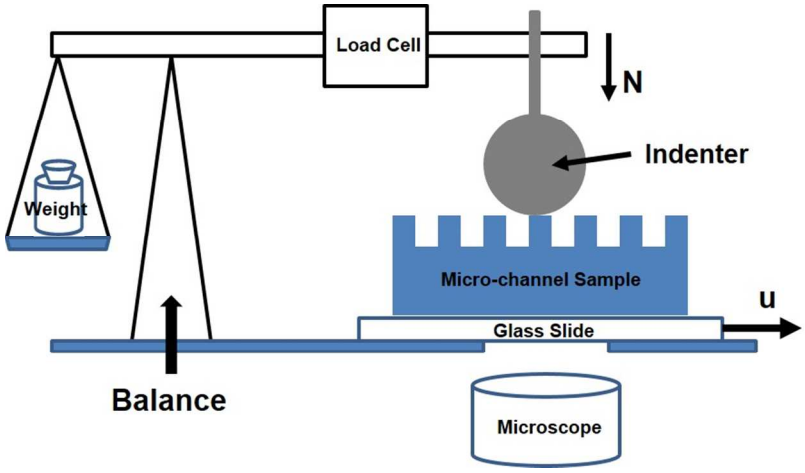

Figure S1. Schematic illustration of the apparatus used for friction tests (side view). A glass indenter was attached to a mechanical balance (Ohaus 310D), and rested on the sample with a fixed normal load (N). The sample was attached to a transparent glass slide, which was moved in the horizontal direction by a motor at a fixed speed, $u = 10\ \mu m/s$. Frictional force was measured by a strain-gauge-based load cell fixed on the balance.

2. Schematic drawings and optical micrographs for samples with channel depth = 13 microns.

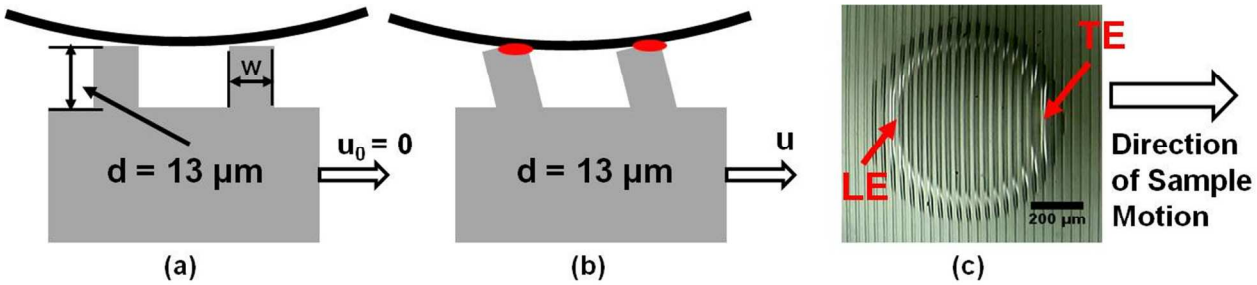

Figure S2. Typical contact region between the smooth indenter and micro-channel based surface with channel depth, d = 13.0 μm: (a) schematic drawing of initial contact without shear (side view); (b) schematic drawing during sliding phase (side view); the small red ellipses mark the regions of real contact; (c) optical micrograph of the contacting area under shear (micro-channel sample: $d = 13.0\ \mu m$, $c = 35\ \mu m$; normal load, $N = 48\ mN$).

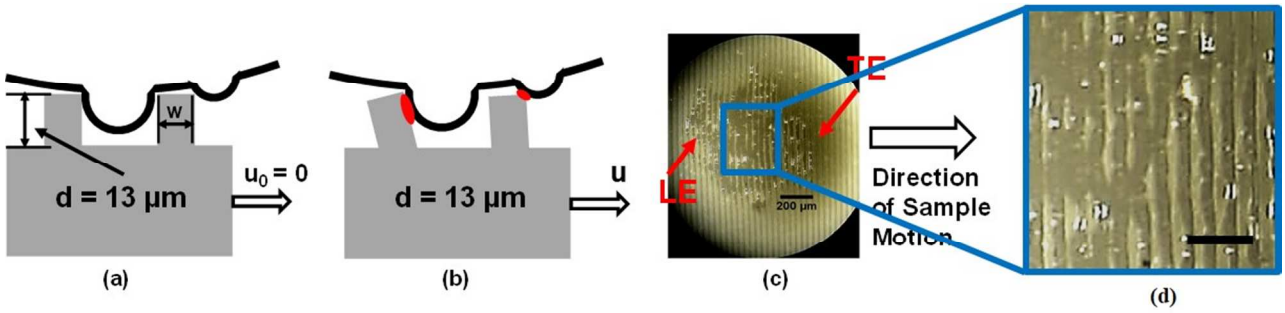

Figure S3. Typical contact region between the randomly rough surface and micro-channel based surface with channel depth, $d = 13.0\ \mu m$: (a) schematic drawing of initial contact (side view); (b) schematic drawing during sliding phase (side view); the red ellipses mark the regions of real contact; (c) optical micrograph of the contacting area under shear (micro-channel sample: $d = 13.0\ \mu m$, $c = 35\ \mu m$; normal load, $N = 48\ mN$). (d) A zoomed-in region shows the increase in real area of contact compared to the smooth indenter. Scale bar, 100 μm.

Table S1. Tabulated data shown in Figure 5, where "Ratio" stands for the ratio of friction force in the structured sample to its flat control, and "std" stands for standard deviation. Samples are identified as, for example, "d10c20", where "d10" stands for nominal depth of 10 microns and actual depth of 13 microns; "d20" stands for nominal depth of 20 microns and actual depth of 26.5 microns, "d30" stands for nominal depth of 30 microns and actual depth of 36 microns; "c20", "c35", "c50", and "c65" stand for periodic spacing of 20, 35, 50, and 60 microns, respectively.

Smooth Indenter	16 mN		32 mN		48 mN		64 mN	
	Ratio	std	Ratio	std	Ratio	std	Ratio	std
d10c20	0.208034	0.012533	0.11316	0.005538	0.116173	0.010346	0.103388	0.006789
d10c35	0.136445	0.012525	0.079274	0.001337	0.072556	0.005156	0.067576	0.001857
d10c50	0.132406	0.002259	0.074422	0.004784	0.077472	0.005148	0.073119	0.008605
d10c65	0.113106	0.005285	0.085613	0.003939	0.074633	0.005763	0.074302	0.004875
d20c20	0.148788	0.005971	0.079353	0.006248	0.075741	0.005377	0.075735	0.0044
d20c35	0.597846	0.011635	0.29409	0.009514	0.289255	0.004773	0.321126	0.006096
d20c50	0.544883	0.012482	0.273587	0.009426	0.266408	0.007846	0.271363	0.011397
d20c65	0.429533	0.008211	0.226006	0.006801	0.193021	0.012827	0.281639	0.007098
d30c20	0.18447	0.000898	0.107525	0.003083	0.102742	0.001061	0.136273	0.006528
d30c35	0.690754	0.005361	0.330871	0.001656	0.319994	0.01218	0.414175	0.022251
d30c50	0.960503	0.008917	0.480185	0.006027	0.414567	0.021747	0.588191	0.000954
d30c65	0.794883	0.007945	0.375947	0.024709	0.440737	0.014899	0.505066	0.007724
Rough Indenter	16 mN		32 mN		48 mN		64 mN	
	Ratio	std	Ratio	std	Ratio	std	Ratio	std
d10c20	0.717241	0.062767	0.733079	0.031502	0.664729	0.029502	0.682212	0.006911
d10c35	0.62069	0.025183	0.738799	0.025365	0.684505	0.036824	0.685	0.054705
d10c50	0.607586	0.032015	0.659676	0.016178	0.646229	0.012566	0.6625	0.007109
d10c65	0.598276	0.016296	0.656816	0.026487	0.644315	0.010313	0.653846	0.031482
d20c20	0.796552	0.032102	0.843184	0.003931	0.818472	0.007027	0.794712	0.012888
d20c35	0.967241	0.019809	1.030982	0.033438	1.052594	0.079022	1.232692	0.0274
d20c50	0.931034	0.005631	0.899905	0.036575	1.17125	0.044734	1.1625	0.024249
d20c65	0.8	0.033314	0.865586	0.100163	1.047491	0.00442	1.110096	0.040105
d30c20	0.872414	0.008903	0.891325	0.017987	0.941593	0.024118	0.913462	0.018512
d30c35	1.204138	0.041837	1.162059	0.019537	1.43727	0.020025	1.497115	0.033986
d30c50	1.163793	0.03204	1.182555	0.047737	1.513822	0.03176	1.489904	0.028712
d30c65	1.032759	0.028919	1.093105	0.069199	1.325631	0.056235	1.18141	0.125477

Table S2. Tabulated data shown in Figure 6, where, "ASS" stands for Apparent Shear Stress and "RSS" stands for Real Shear Stress.

a) 32 mN

			average		stdev	ASS	Var	stdev	RSS	Var	Stdev	Sample
27.6	27.4	27.6	27.62	0.02762	0.000148	56054.64	355186.1	595.9749	143550.3	13144178	3625.49	flat control
23.5	23.4	23.3	23.54	0.02354	0.000207	42629.97	753840.5	868.2399	67040.64	1032833	1016.28381	d30c20
31.5	31	31.2	31.3	0.0313	0.000346	50460.16	2227043	1492.328	95014.74	6610554	2571.09984	d30c35
32.6	32.4	32.8	32.56	0.03256	0.000167	69263.31	6296177	2509.218	115304.1	1291649	1136.50731	d30c50
29.4	29	29.9	29.46	0.02946	0.000329	61225.69	2591896	1609.937	106595.5	7701999	2775.24757	d30c65
22	21.8	22.5	22.18	0.02218	0.000311	44795.12	1096255	1047.022	70493.42	2075668	1440.71771	d20c20
28.2	28.4	27.8	28.24	0.02824	0.000297	57257.59	1766510	1329.101	89460.1	15084650	3883.89626	d20c35
22.4	22.2	22.8	22.48	0.02248	0.000228	43405.4	642158.7	801.348	84228.7	8588133	2930.55171	d20c50
24.9	24	23.5	23.98	0.02398	0.000572	45359.05	1856807	1362.647	101024.3	28304824	5320.22779	d20c65
18.8	18.5	18.7	18.76	0.01876	0.000182	40224.35	323623.5	568.8792	71355.02	3412454	1847.28274	d10c20
19.2	18.9	19.7	19.34	0.01934	0.000321	38866.22	842315.8	917.7777	91489.84	2815895	1678.06283	d10c35
17.7	17.5	17.6	17.72	0.01772	0.000192	33036.68	784386.3	885.6559	75101.62	2170130	1473.13616	d10c50
17.9	17.7	16.7	17.82	0.01782	0.000712	32951.03	2218495	1489.461	87635.32	14465473	3803.35026	d10c65

b) 48 mN

			average		stdev	ASS	Var	Stdev	RSS	Var	Stdev	
40	41	40.5	40.5	0.0405	0.0005	77838.7	1703360	1305.128	142150.5	5838789	2416.359	flat contro
37.6	37.5	37.7	37.66	0.03766	0.000114	64947.31	250437.9	500.4378	108544.1	5049300	2247.065	d30c20
56.2	56.4	56	56.22	0.05622	0.000228	104358.1	2700959	1643.459	188914.2	8737712	2955.962	d30c35
60.2	60.4	60	60.32	0.06032	0.000217	118193.6	894067	945.5511	213337.3	19658731	4433.817	d30c50
53	53.2	52.5	52.64	0.05264	0.000472	98855.35	3038184	1743.039	174075.8	18169690	4262.592	d30c65
32.2	32.5	32	32.3	0.0323	0.000212	60770.91	838512.9	915.7035	107042.8	17302686	4159.65	d20c20
45.2	45.2	45.6	45.36	0.04536	0.000182	86614.39	1197048	1094.097	149828.6	15979948	3997.493	d20c35
47.2	47.6	47.5	47.36	0.04736	0.000207	82192.36	1778553	1333.624	152697.3	11196657	3346.141	d20c50
41	41.5	40.5	40.7	0.0407	0.00057	70967.17	2389396	1545.767	145501.9	17865817	4226.798	d20c65
27.8	27.6	27.4	27.5	0.0275	0.0002	49041.11	1196901	1094.03	86745.41	3079716	1754.912	d10c20
27.4	27.5	27.3	27.28	0.02728	0.000192	46713.45	226912.2	476.353	113333.6	5390754	2321.8	d10c35
25.5	26	26.3	25.7	0.0257	0.000442	42226.51	1101227	1049.393	102344.7	12853530	3585.182	d10c50
25.2	24	24.2	24.92	0.02492	0.000879	41188	2152737	1467.221	103048.4	16509480	4063.186	d10c65

c) 64 mN

			average		stdev	ASS	Var	Stdev	RSS	Var	Stdev	
53.5	52.5	53.5	53.3	0.0533	0.00057	83962.44	1503429	1226.144	142629.7	4121974	2030.265	flat contro
47.8	47.4	47.7	47.54	0.04754	0.000241	59271.14	1719056	1311.128	93616.25	2144156	1464.294	d30c20
75.8	75.6	75.9	75.78	0.07578	0.000303	113795.4	8581519	2929.423	167830.4	15773265	3971.557	d30c35
75.2	75.8	74.6	75.14	0.07514	0.000434	110762.4	4961666	2227.48	162144.3	13329878	3651.011	d30c50
64.5	65	64	64.2	0.0642	0.00057	93824.96	4211965	2052.307	150154.7	4269917	2066.378	d30c65
41.1	40.8	40.1	40.56	0.04056	0.000416	53714.62	626631.8	791.6008	79311.64	1386228	1177.382	d20c20
64	64.2	64.5	64.02	0.06402	0.000349	95912.74	1320655	1149.197	134587.6	1650293	1284.637	d20c35
60.1	60.1	60.5	60.18	0.06018	0.000192	87428.11	1085004	1041.635	132837	3174591	1781.738	d20c50
59	57	58	57.8	0.0578	0.000837	84423.11	4516322	2125.164	143862.1	15534793	3941.42	d20c65
36.2	35.8	35.5	35.7	0.0357	0.000316	56859.58	394377.9	627.9952	93778.65	1816024	1347.599	d10c20
36.2	35.8	35.6	35.76	0.03576	0.000297	53066.15	286146.5	534.9266	85529.53	772028.6	878.6516	d10c35
34.2	34	33.6	33.86	0.03386	0.000297	49158.48	535086.3	731.496	86172.45	5716995	2391.024	d10c50
35.5	34	32.6	33.72	0.03372	0.001232	47992.96	3279134	1810.838	85851.24	11149040	3339.018	d10c65