Electronic Supplementary Material (ESI) for Soft Matter.

Mechanism of liquid transfer between two surfaces and the role of contact angles

H. Chen[1], T. Tang[1], A. Amirfazli[2]*,

1. Department of Mechanical Engineering, University of Alberta, Edmonton,

AB, T6G 2G8, Canada

2. Department of Mechanical Engineering, York University, Toronto,

ON, M3J 1P3, Canada

*Corresponding Author: Tel: 416-736-2100, ext55901;
Email: alidad2@yorku.ca

Details of surfaces fabrication and contact angle measurements

Table S1 shows the details of the selected material, fabrication methods, and the parameters chosen for each of the fabrication methods. Sessile drop method was used to measure the dynamic contact angle between distilled water and the fabricated surfaces. On each surface, measurements for contact angle were conducted at three different locations. Each of the advancing contact angles and receding contact angle in Table 1 of the letter are the average value of the 3 measurements.

Table S1. Technical details of fabricating each surface used in this study. Except

Silicon and OTS surfaces, all the other surfaces were fabricated with the techniques similar to one found in Ref.15.

Surface Name	Method	Material and fabrication details
Silicon	N/A	100 mm -orientation silicon wafers (Silicon Valley Microelectronics, Inc.)
PMMA(1)	Spin coat	Solution: 2wt% solution of PMMA (Aldrich Mw~120000) in toluene Spin coater speed: 1000 RPM Spin time: 60s
PMMA(2)	Spin coat	Solution: 0.2wt% solution of PMMA (Aldrich Mw~120000) in toluene Spin coater speed: 2000 RPM Spin time: 60s
PMMA(3)	Spin coat	Solution: 1wt% solution of PMMA (Aldrich Mw~120000) in toluene Spin coater speed: 2000 RPM Spin time: 60s
Blend (1)	Spin coat	Solution: 1wt% PMMA (Aldrich Mw~120,000) and Polystyrene (Aldrich Mw~35,000) mixed in toluene solution , ratio of PMMA: Polystyrene = 15:1 Spin coater speed: 1500 RPM Spin time: 60s
Blend (2)	Spin coat	Solution: 1wt% PMMA (Aldrich Mw~120,000) and Polystyrene (Aldrich Mw~35,000) mixed in toluene solution , ratio of PMMA: Polystyrene = 6:1 Spin coater speed: 1500 RPM Spin time: 60s
PS (1)	Heat press	Material: Polystyrene (Aldrich Mw~35,000) Plate: Two slices of spin coated Teflon AF surface Temperature: 185°C Time: 2 mins. Pressure: 645 Pa After heat press, surface was placed into 20 °C distilled water immediately. Cleaned by FC-75 again, after detached from the plate.
PEMA	Spin coat	Solution: 1wt% solution of Poly (ethyl methacrylate), (Aldrich Mw~515,000) in toluene Spin coater speed: 2000 RPM Spin time: 60s
PS (2)	Spin coat	Solution: 1wt% solution of Polystyrene, (Aldrich Mw~35,000) in toluene Spin coater speed: 2000 RPM Spin time: 60s
OTS	N/A	Microscope slides wafers were soaked in 95% OTS Solution for 30 mins.
Teflon AF	Spin coat	Solution: Teflon AF (DuPont Teflon AF 601s2-100-6) diluted with FC-75 (3M) in the ratio of 1:5 Spin coater speed: 1500 RPM Spin time: 60s

Evolutions of total adhesion force during liquid transfer

The evolutions of total adhesion force with surface separation are shown in Figure S1 for cases 1 and 8. From this plot, it can be seen that due to the different wettability of the donor surface (Case 1: θ_a =55.1°, θ_r = 45.7°; Case 8: θ_a = 91.8°, θ_r = 75.3°), the evolutions of the total adhesion force are very different for the two cases. Specifically, because the donor surface is more hydrophilic in case 1 than in case 8, at the same separation, the adhesion force is larger in case 1 than in case 8. However, after contact line pinning starts, the geometry of the liquid bridge near the donor surface of case 1 approaches that near the acceptor surface of case 8; as well the geometry of the liquid bridge near the acceptor surface of case 1 approaches that near the donor surface of case 8. The difference in adhesion force becomes smaller and the values of F_{pf} are almost identical.

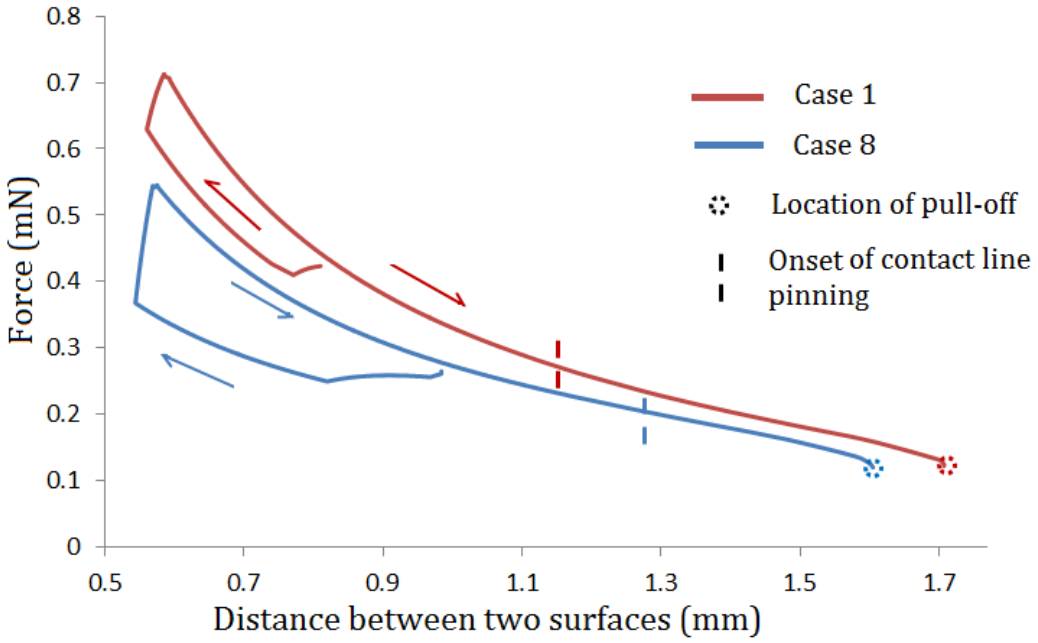

Figure S1.Evolution of total adhesion force with surface separation in cases 1 and 8.