Supporting Information

A Self-Assembled, Low-Cost, Microstructured Layer for Extremely Stretchable Gold Films

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For video S1, the strain sensor was connected to a breadboard and an Arduino Uno singleboard controller in order to control which LEDs light up due to changes in resistance in the sensor. The code to program the Arduino was adapted from: http://arduinobasics.blogspot.ca/2011/05/arduino-uno-flex-sensor-and-leds.html (Available in Supplementary Information). The Arduino's analog-to-digital converter converts the input voltage (from 0-5V) to a digital value between 0 and 1023. The digital values dictate the output corresponding to an LED numbered from 4-13 which controls which LEDs turn on.

Code for Arduino LED Control

Adapted from:

http://arduinobasics.blogspot.ca/2011/05/arduino-uno-flex-sensor-and-leds.html

```
const int flexPin = A0;

void setup()(a) PDMS/glue1:1 (b) PDMS/glue3:1 (c) PDMS/glue5:1.
  Serial.begin(9600);
}

void loop(){

  int flexReading = map (analogRead(flexPin), 0, 1023, 13, 4);
  int LEDnum = constrain(flexReading, 4, 13);

  for (int x=4; x<LEDnum; x++){
  digitalWrite (x, HIGH);
  }
```

```
  for (int x=LEDnum; x<13; x++){
    digitalWrite (x, LOW);
  }
}
```

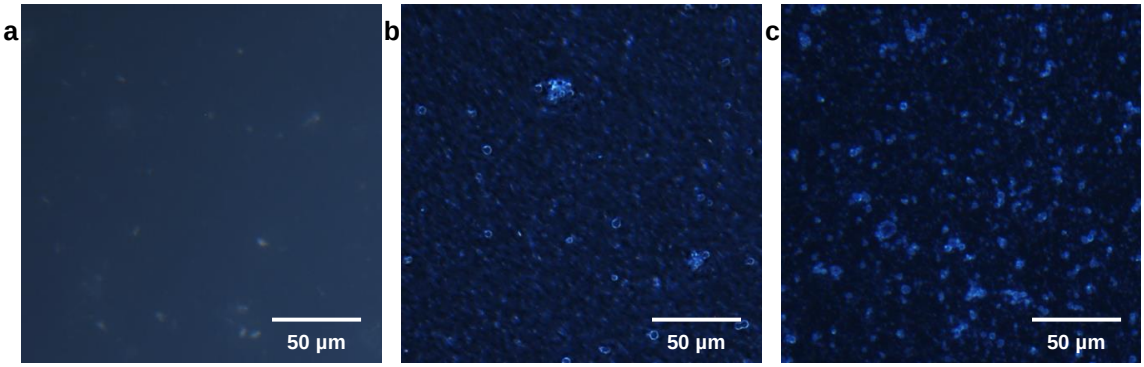

Figure S1. Optical micrographs of glue emulsions in water (a) 1:1 water:glue (b) 3:1 water:glue (c) 5:1 water:glue.

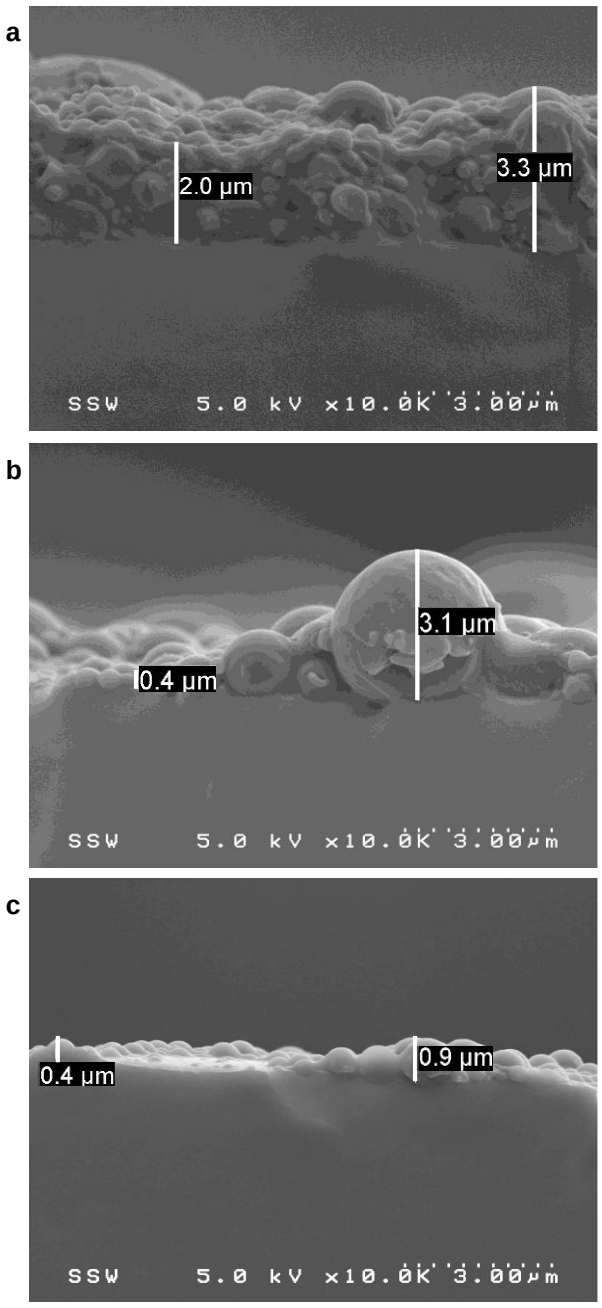

Figure S2. SEM cross sections of (a) PDMS/glue$_{1:1}$ (b) PDMS/glue$_{3:1}$ (c) PDMS/glue$_{5:1}$.

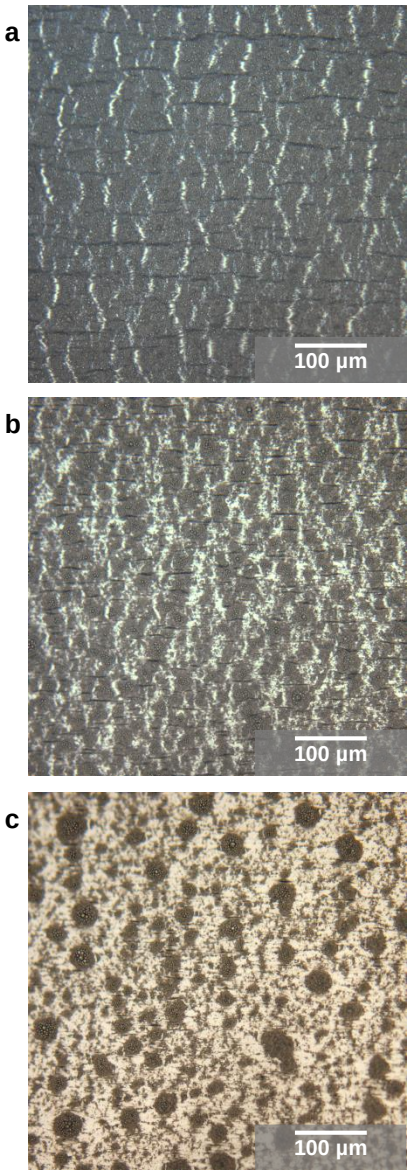

Figure S3. Optical microscope images of glue layers on PDMS stretched to 60% elongation. (a) PDMS/glue$_{1:1}$ (b) PDMS/glue$_{3:1}$ (c) PDMS/glue$_{5:1}$. The samples are stretched in the horizontal direction, and the compressive strain induced by stretching can be observed as buckles parallel to the direction of stretching.

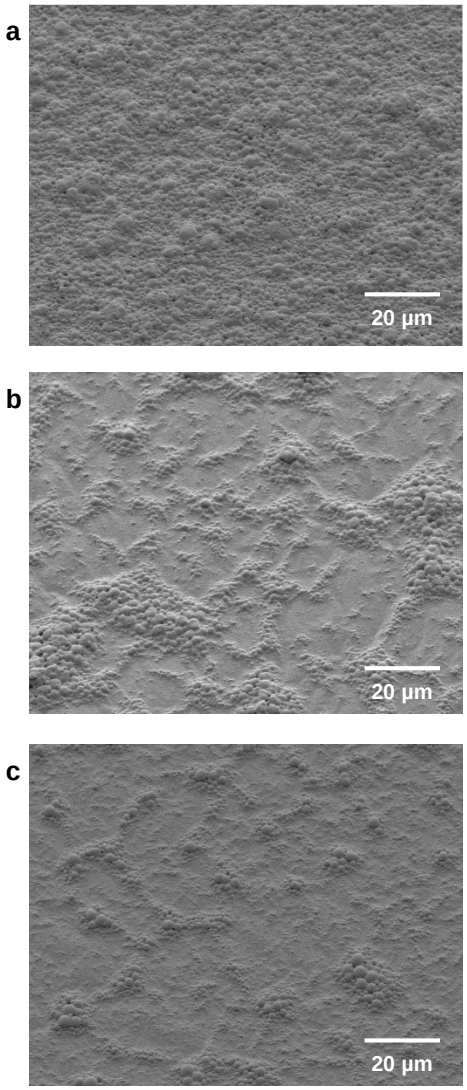

Figure S4. SEM images of 250-Å-thick gold with 30-Å-thick titanium adhesion layer on (a) PDMS/glue$_{1:1}$ (b) PDMS/glue$_{3:1}$ (c) PDMS/glue$_{5:1}$.

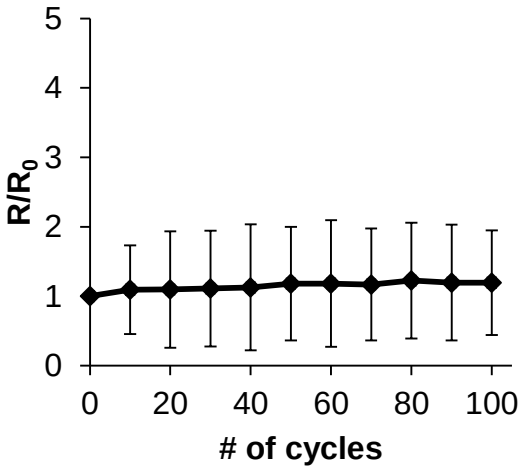

Figure S5. Plot of normalized resistance as a function of PDMS/glue$_{3:1}$/gold with repetitive cycles of 15% elongation and release.