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# ELECTRONIC SUPPLEMENTARY INFORMATION

## Fabrication and analysis of enforced dry adhesives with core-shell micropillars

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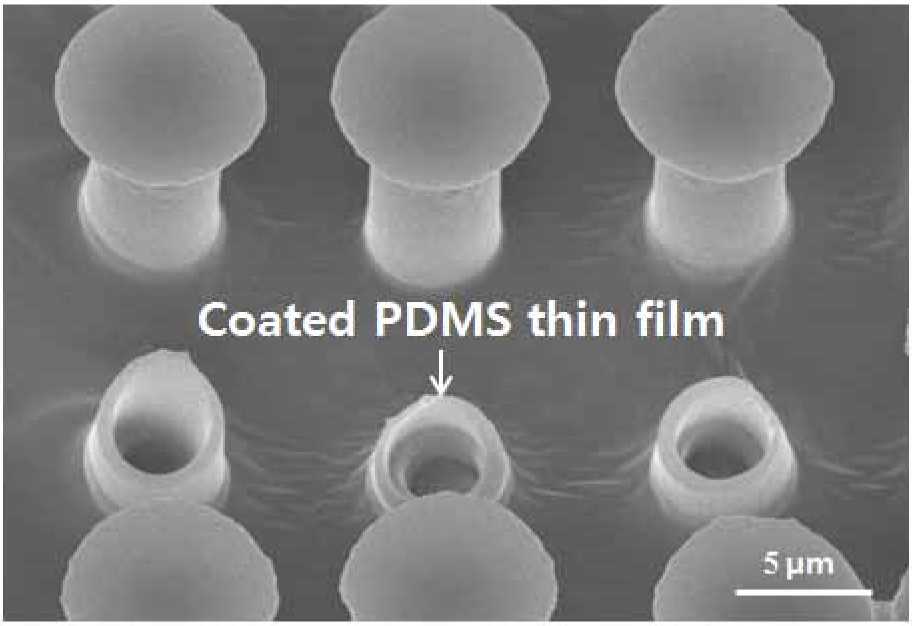


**Fig S1.** SEM image showing the effect of plasma treatment on the stability of core-shell micropillars. Without the treatment, local delaminations were frequently observed with repeated uses.

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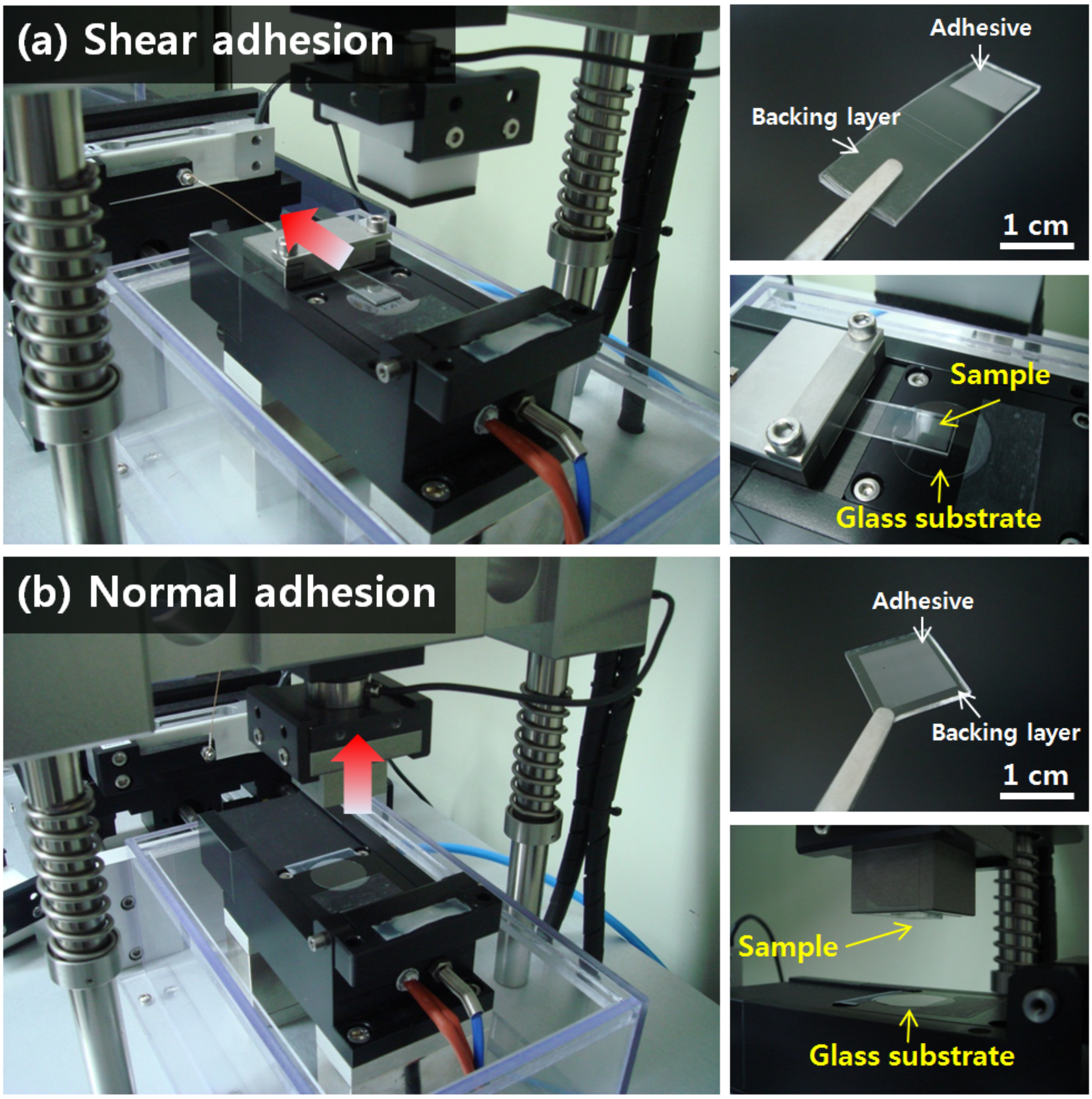
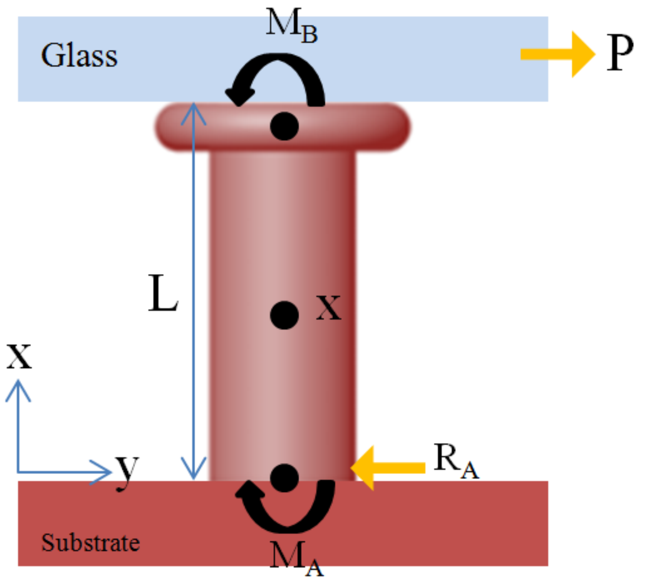



**Fig S2.** Optical images of the custom-built equipment used in our experiment for adhesion test: (a) shear adhesion and (b) normal adhesion. The sample is 1 mm thick with a patterned area of 1 × 1 $cm^2$.

**Detailed derivation of the displacement *V* of micropillars using beam deflection theory**




Boundary condition:

$$\sum F = 0 \quad (\because R_A = P)$$

$$\sum M = 0 \quad (\because -M_A - PL + M_B = 0)$$

**Fig S3.** Geometric description of micropillar.

The above expression for the bending moment can be expressed into a second-order differential equation, yielding

$$\frac{d^2 v}{dx^2} = \frac{M_{(x)}}{EI} \tag{S1}$$

$$EI\frac{d^2 v}{dx^2} = M_{(x)} = M_a + R_a x \tag{S2}$$

$$EI\frac{dv}{dx} = M_a x + \frac{1}{2}R_A x^2 + C_1 \tag{S3}$$

$$EIv = \frac{1}{2}M_a x^2 + \frac{1}{6}R_A x^3 + C_1 + C_2 \tag{S4}$$

$$C_1 = 0, \because x = 0, \frac{dv}{dx} = 0 \tag{S5}$$

$$C_2 = 0, \because x = 0, v = 0 \tag{S6}$$

Then, the deflection ν at the tip is given by

$$v = \frac{1}{EI}\left(\frac{1}{2}M_a x^2 + \frac{1}{6}R_A x^3\right) \tag{S7}$$

$$v_{(x=L)} = \frac{1}{EI}\left(\frac{1}{2}M_a L^2 + \frac{1}{6}R_A L^3\right) \tag{S8}$$

$$v_{(x=L)} = \frac{1}{EI}\left(-\frac{1}{4}PL^3 + \frac{1}{6}PL^3\right) \quad \because M_a = -\frac{P}{2}L, R_A = P \tag{S9}$$

$$\text{A}\, v_{(x=L)} = \frac{1}{EI}\left(-\frac{1}{12}PL^3\right) = -\frac{PL^3}{12EI} \tag{S10}$$