

Electronic Supplementary Material

Constructing a biomimetic robust bi-layered hydrophilic lubrication coating on surface of silicone elastomer

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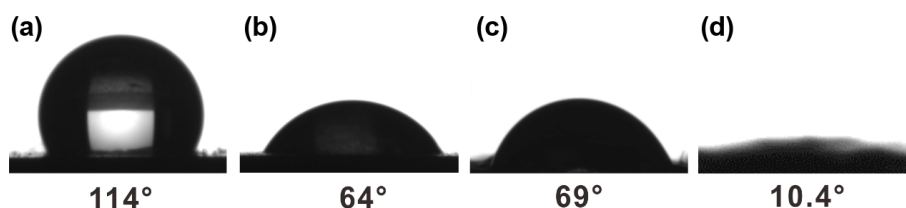


Fig. S1 Images of water contact angle. (a) Polydimethylsiloxane (PDMS); (b) PDMS-3-(trimethoxysilyl) propyl methacrylate (PDMS-KH570); (c) PDMS-KH570-hydrogel; and (d) PDMS-KH570-hydrogel-3-[[2-(methacryloyloxy) ethyl] dimethylammonio] propane-1-sulfonate (PDMS-KH570-hydrogel-PSBMA).

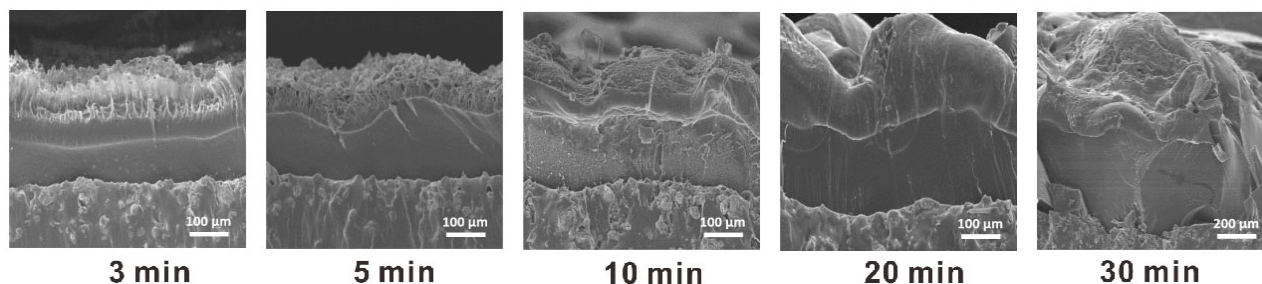


Fig. S2 Cross-sectional scanning electron microscopy (SEM) images of PDMS-KH570-hydrogel-PSBMA with different hydrogel growth time (Polymerization time: 120 min).

The average contact pressure (P_m) was calculated by classical Hertz contact model [1]:

$$\frac{1}{E^*} = \frac{1}{2} \left(\frac{1-\nu_1^2}{E_1} + \frac{1-\nu_2^2}{E_2} \right) \quad (1)$$

$$a_{1N} = \left(\frac{3F_N R}{2E^*} \right)^{1/3} \quad (2)$$

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$$P_m = \frac{F_N}{\pi a_{1N}^2} \quad (3)$$

where E^* is the reduced Young's modulus, E_1 and E_2 are the Young's moduli of the hydrogel (2.97 MPa) and 316L (199 GPa), ν_1 and ν_2 are the Poisson's ratios of the hydrogel (0.46) and 316L (0.29). F_n is the load and a_{1n} is the estimated contact radius. R is the radius of 316L ball (3 mm), P_m is the mean contact pressure.

Table S1 Contact pressure calculated under different loads and corresponding friction coefficient (COF).

Load (N)	COF	Average contact pressure P_m (MPa)
1	0.040	0.452
2	0.046	0.569
5	0.049	0.773
10	0.062	0.973
20	0.099	1.226

Reference

- [1] Kosukegawa H, Fridrici V, Laurenceau E, Kapsa P, Ohta M. Friction of 316L stainless steel on soft-tissue-like poly (vinyl alcohol) hydrogel in physiological liquid. *Tribol Int* **82**: 407–414 (2015)