Hierarchical Pore Structures Fabricated by Electron Irradiation of Silicone Grease and Their Applications to Superhydrophobic and Superhydrophilic Films

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Figure S1. a) FESEM image of an electron-irradiated pure PDMS film, b) FESEM image of locally irradiated pure PDMS film captured during in-situ electron irradiation experiment. Inset shows a tilted FESEM image of another irradiated pure PDMS film with Pt-Pd coating.

Figure S2. a) XPS survey spectra of the pristine and the irradiated PDMS, b) Si 2p spectra of the pristine and the irradiated PDMS. The Si 2p peak of the pristine PDMS was centered at 102.1 eV, associated with SiO$_2$C$_2$ of tetrahedral Si bonds. After the electron irradiation, the Si 2p peak shifted to 103.1 eV, which can be deconvoluted into three peaks at 102.1 eV, 102.8 eV (SiO$_3$C), and 103.4 eV (SiO$_4$). The peak intensity of the irradiated PDMS at 102.1 eV decreased compared to that of the pristine PDMS, while the peak of SiO$_4$ tetrahedral bond became dominant.
Figure S3. Image capturing during in-situ electron irradiation experiment, showing the formation of bubble and pore: irradiation time increased from a) to d).

Figure S4. a) XPS survey spectra of the pristine and the irradiated silicone grease films, b) Si 2p spectra of the pristine and the irradiated films. The deconvoluted Si 2p peak shows that pristine PDMS peak almost disappeared while SiO₄ of the tetrahedral Si bonds are major components. In addition, Si 2p peak at 103.2 eV was slightly higher than that of the electron-irradiated pure PDMS. These indicate that a large number of silica nanoparticles embedded in the film remained and that PDMS inside the film was transformed into silica-like material.
Figure S5. FESEM image of randomly separated micrometer-sized pores: nanoparticles were rarely found on the surface. Scale bar is 20 µm.

Figure S6. Advancing and receding contact angles of the fluorosilane-treated film.
Figure S7. Sliding angle of the fluorosilane-treated film: a) a water drop without titling the substrate, b)-f) sliding behavior of the water drop after tilting the substrate by 2°. Images were captured with the time interval of 0.025 s.