Electronic Supplementary Material (ESI) for Nanoscale.

Supporting Information of:

Polylactic Acid Nano- and Microchamber Arrays for Encapsulation of Small Hydrophilic Molecules Featuring Drug Release via High Intensity Focused Ultrasound

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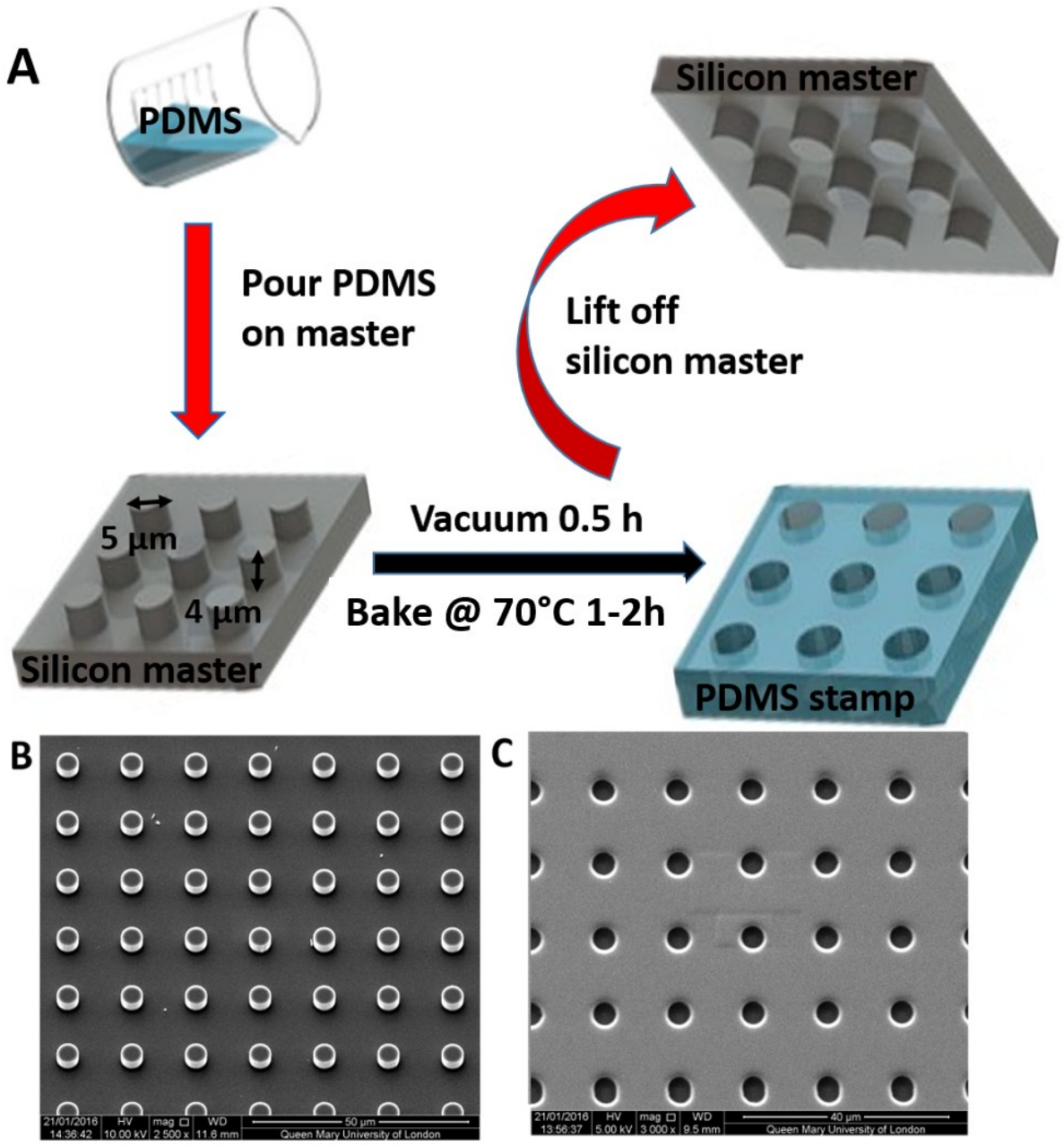

Figure S1. Used PDMS stamps and silicon masters: A) Schematic illustration of patterned PDMS stamp fabrication. B) SEM image of patterned silicon master with micropillars on the surface. C) SEM image of patterned PDMS stamp with microwells on the surface made from silicon master.

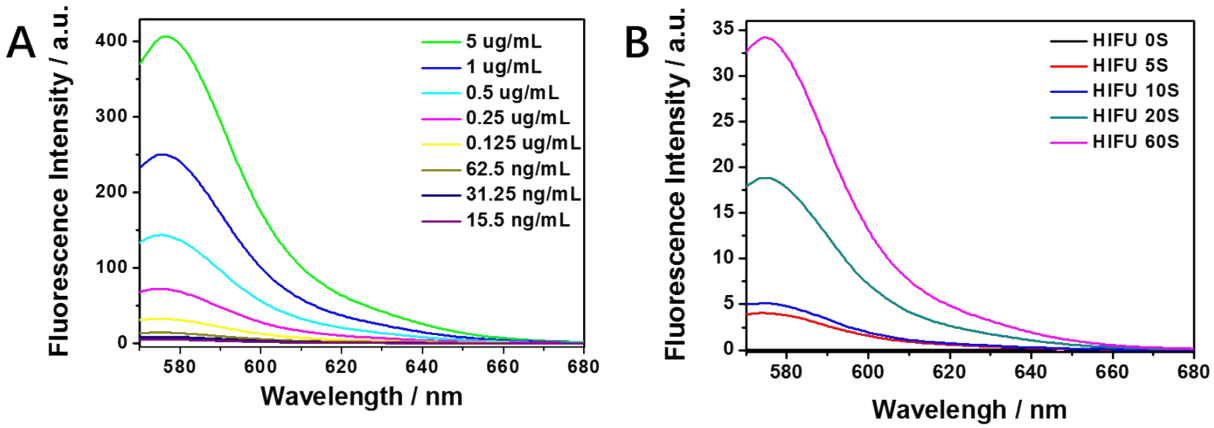

Figure S2. A) RhB fluorescence calibration curve, B) Amount of released RhB from PLA@RhB microchambers corresponding to the HIFU radiation duration.

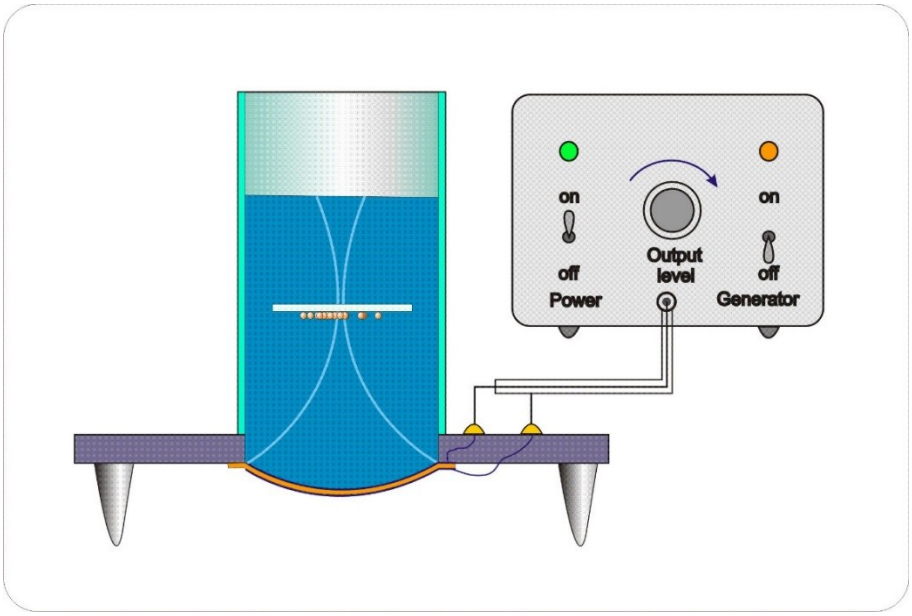

Figure S3. Scheme of high intensity focused ultrasound (HIFU) set up. The experimental set up for radiation of HIFU beam represents the assembly of two separate devices which are connected by a coaxial transmission cable. The first device is the signal generator (gray box) while the second device is the water (dark blue) filled irradiation chamber (green lines). The signal is produced by a concave transducer (orange) focusing the ultrasound on a small (D~500 μm) spot (light blue lines). The acoustical density in focus area reached up to 200-300 W/cm^2.

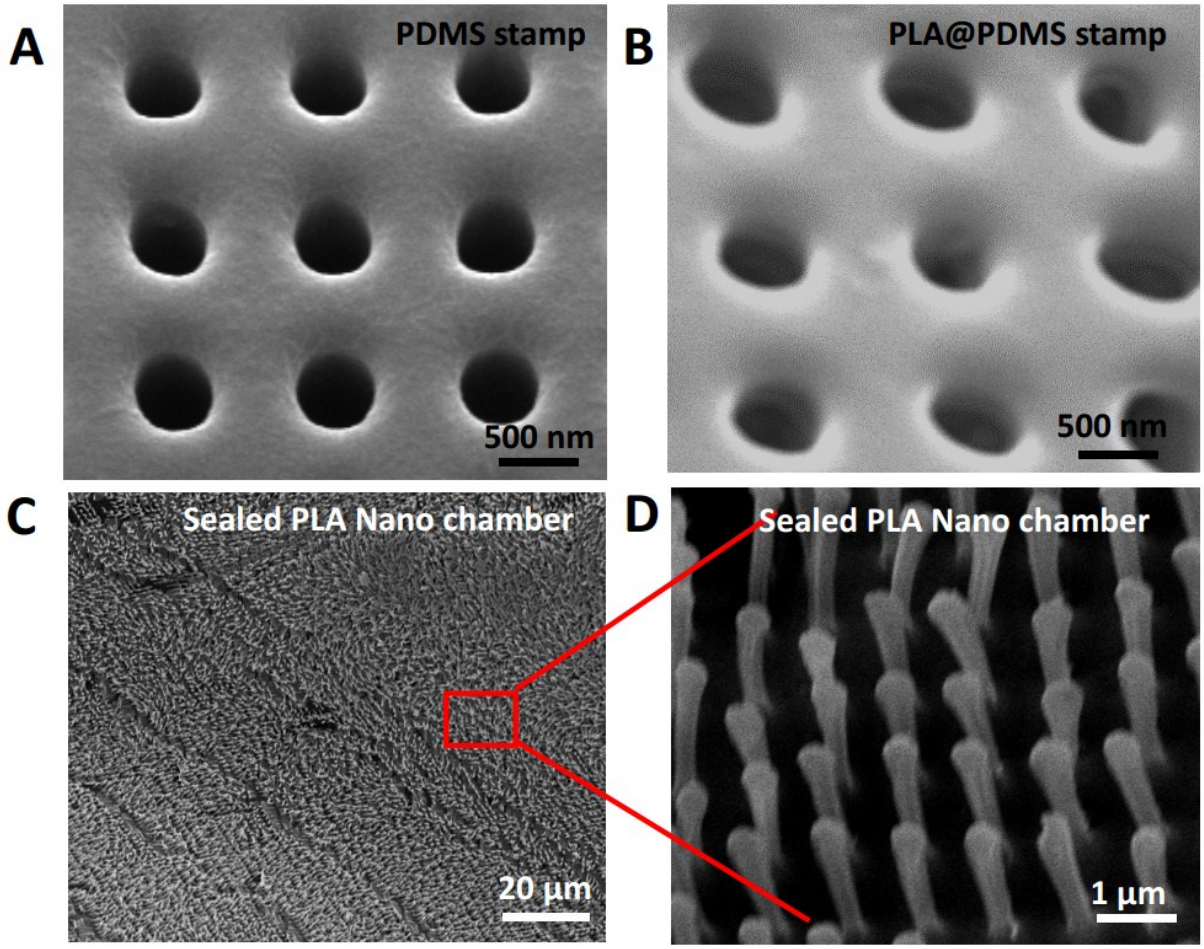

Figure S4. Produced nano-chambers; A) utilized patterned PDMS stamp with nanowells on the surface; B) PLA coated PDMS stamp proving empty nanochambers; C) sealed PLA chambers on top of a PLA sealing layer; D) zoom into C).

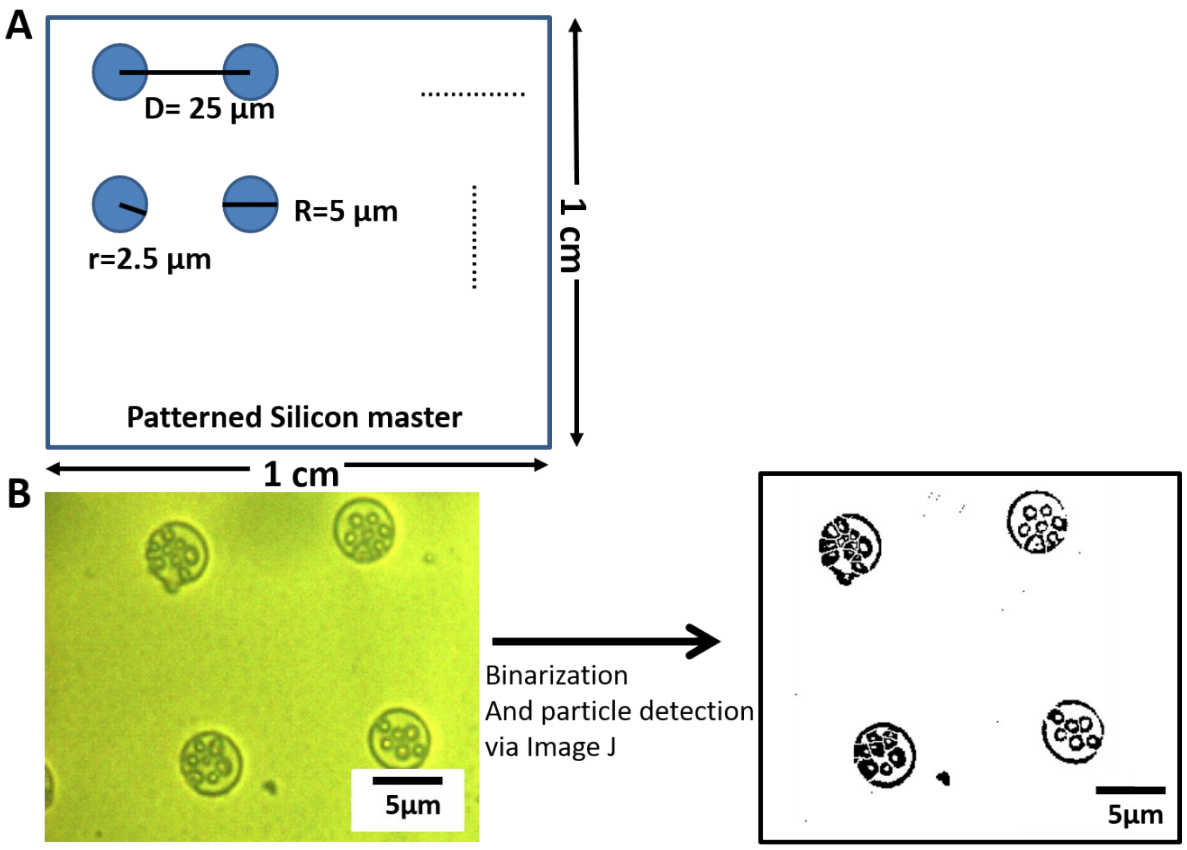

Figure S5. A) Schematic illustration of the micro-patterned silicon master (size: 1 cm × 1 cm) with micropillars (5 µm diameter, 4 µm height and a center to center distance of 15 µm) used in this work. 160,000 microchambers are exhibited on 1 cm². B) Calculation of the encapsulated RhB amount via ImageJ software; each single PLA microchamber is loaded with 8 to17 pg RhB.

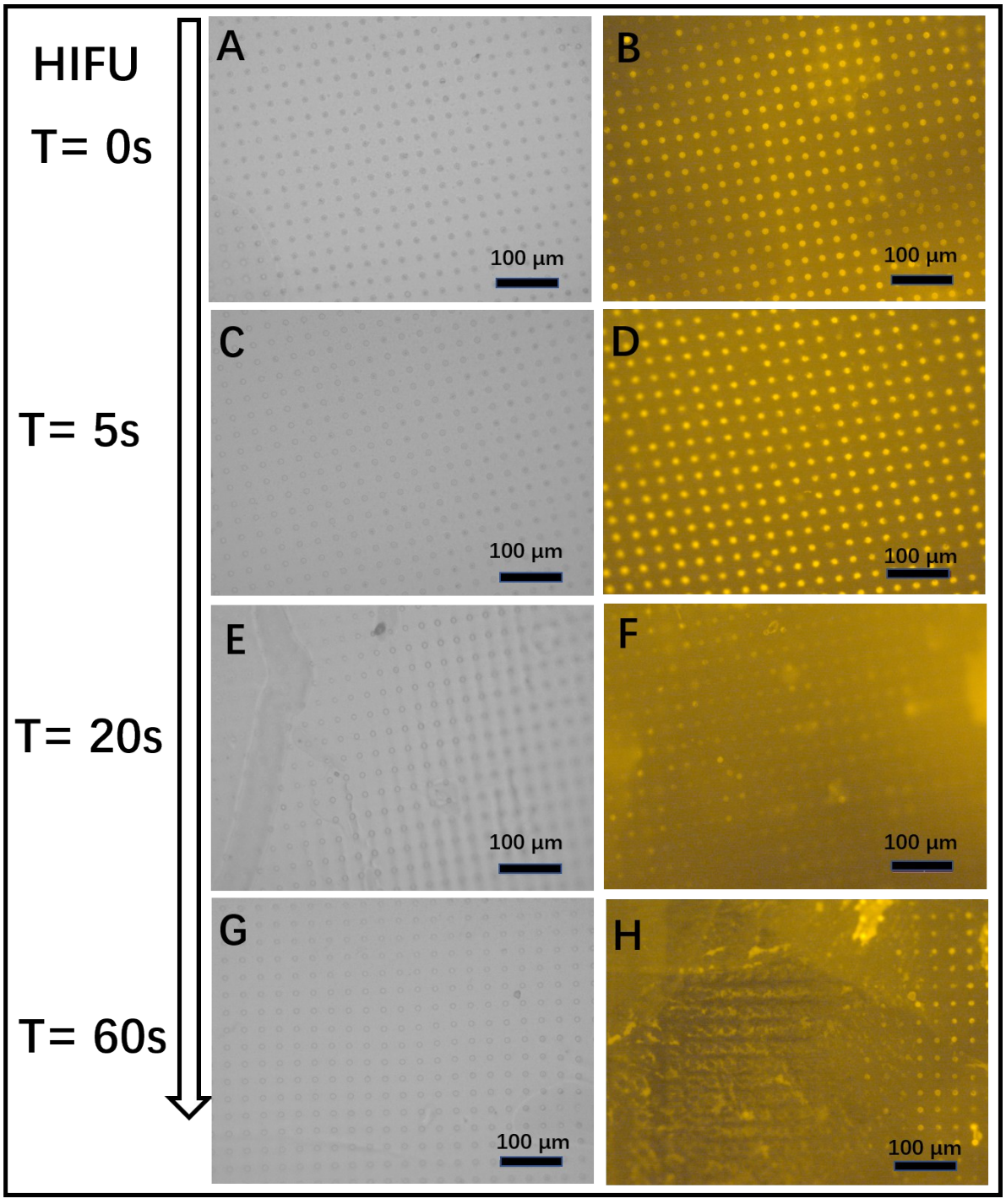

Figure S6. Free-standing sealed PLA@RhB microchambers after HIFU exposure. The left line are bright field micrographs and right line are fluorescence micrographs after 0 s, 5 s, 20 s and 60 s HIFU exposure.

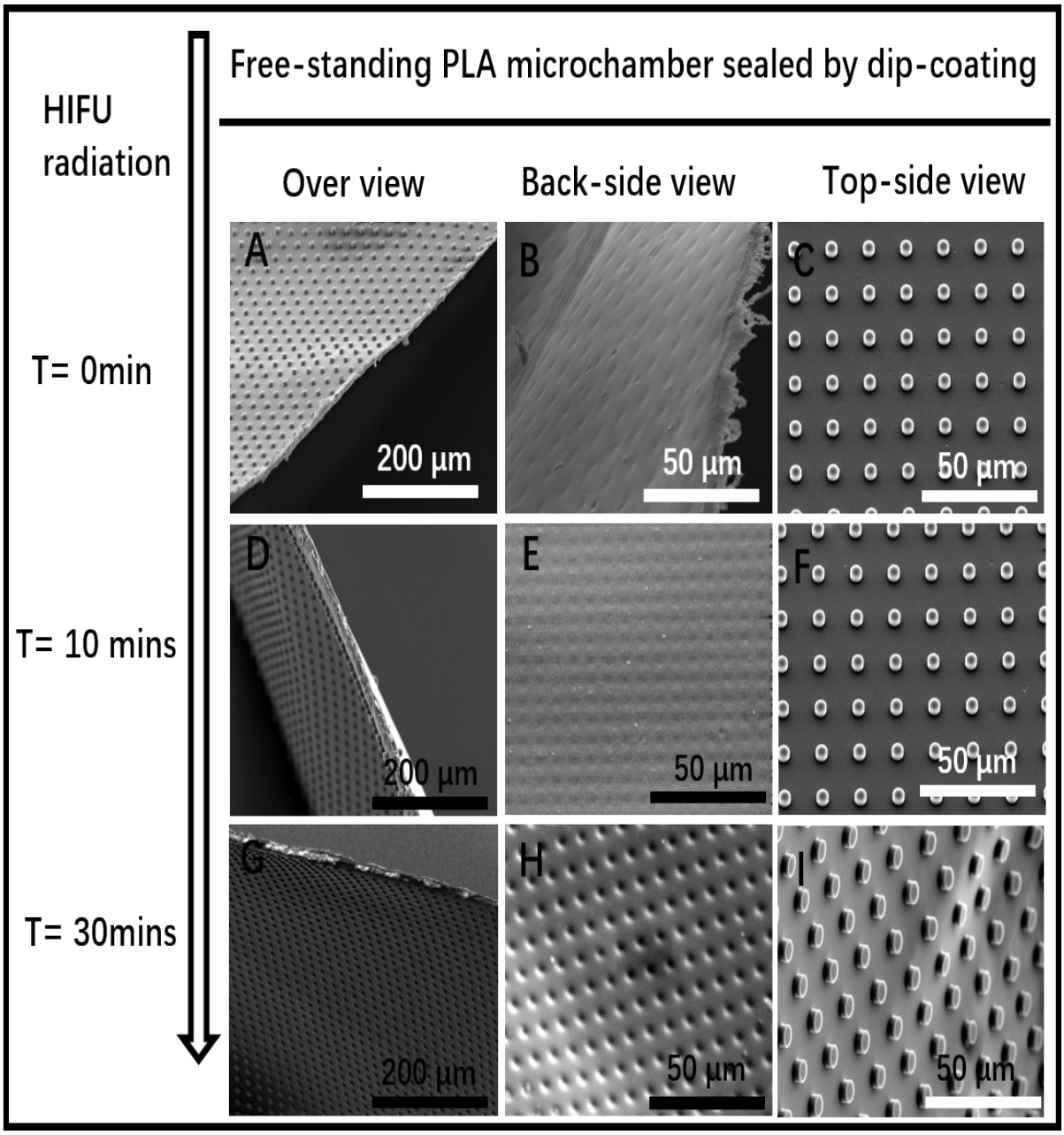

Figure S7. SEM micrographs of free-standing PLA microchambers sealed by one-more-step dip-coating a PLA layer under ultrasound treatment. 0 s (first row), 10 mins (second row), 30 min (last row) at different magnification. A), D), G) Overview of free-standing sealed PLA microchambers, B), E), H) backside view and C), F), I) are the top-side view of PLA microchambers after HIFU radiation.