Supporting Information

Bicontinuous interfacially jammed emulsion gels with nearly uniform sub-micrometer domains via regulated co-solvent removal

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Supplementary videos

SI video. Confocal z-stack of VIPS-STRIPS bijel film.

Control over VIPS-STRIPS bijels film thickness

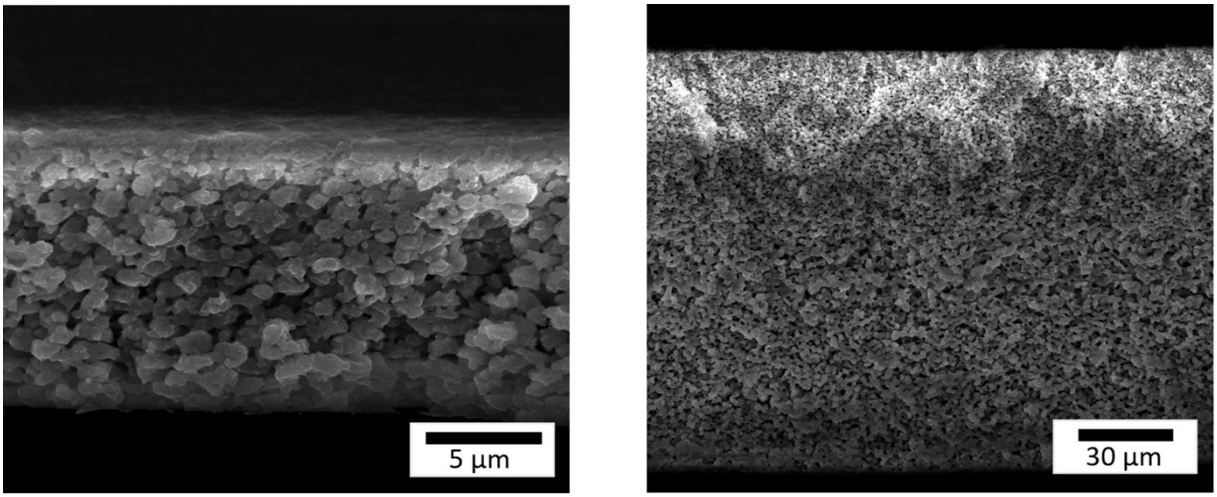

Figure S1. Cross-sectional SEM images of VIPS-STRIPS bijels film: (a) VIPS-STRIPS bijels with film thickness of around 10 µm. (b) VIPS-STRIPS bijels with film thickness over 130 µm.

In the VIPS-STRIPS method, as shown in Figure S1, control over the film thickness is achieved by varying the thickness of the precursor mixture film. For example, when applied by blade coating, the thickness of the precursor mixture film can be adjusted by using different doctor blades. Because the mismatch in the refractive indices between the oil and water phases are not too big, the UV irradiation can induce polymerization throughout the entire thickness of the "wet" bijel film without significant scattering. The rigidity of the gelled VIPS outer layer protects the internal liquid layer from strong disturbances when entering outer aqueous phase, avoiding the formation of defects like wrinkles and holes that can often form in relatively thick (>100 µm) bijel films on solid supports.

Temperature change induced by ethanol evaporation

The VIPS process drops the temperature by 5-7 °C which we have measured directly. It is likely that this temperature drop may change the precise phase diagram; however, such a change does not seem to affect the bijel formation.

Different quenching paths of VIPS and STRIPS methods

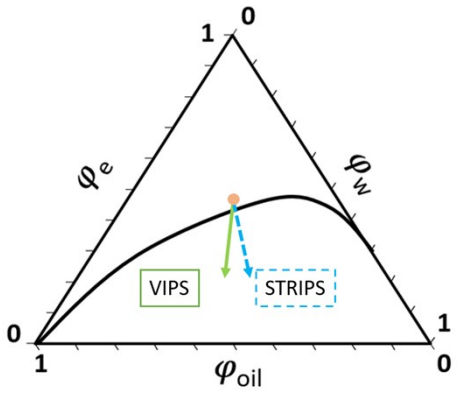

Figure S2. Representative quenching paths (removal of ethanol from precursor mixture) of VIPS and STRIPS methods are indicated by the green solid arrow and blue dashed arrow respectively.

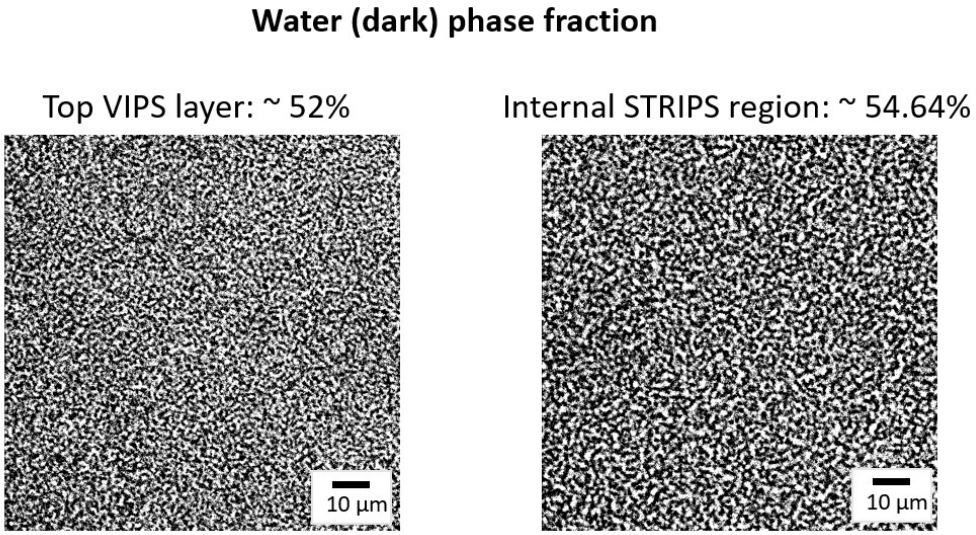

Figure S3. Binarized fluorescent images of VIPS-STRIPS top VIPS layer and internal STRIPS region and their water phase fractions. Dark phase represents water phase.

VIPS and STRIPS follow slightly different quenching paths as shown in Figure S2. In STRIPS method, water permeates into the phase separating mixture from the outer aqueous phase. Therefore, the STRIPS bijels becomes water rich. In contrast, in VIPS method, water co-evaporates with ethanol from the precursor mixture. As a result, the VIPS bijels becomes richer in oil. By analyzing the binarized fluorescent images of structures in the two regions, the fraction of water and oil phases can be calculated using ImageJ as shown in Figure S3. For a sample with a 8s VIPS treatment, the internal STRIPS region is richer in water phase by 2.64%.

Fast Fourier transform analysis of VIPS-STRIPS bijel structures at different vertical distance from the top surface (in log-log scale)

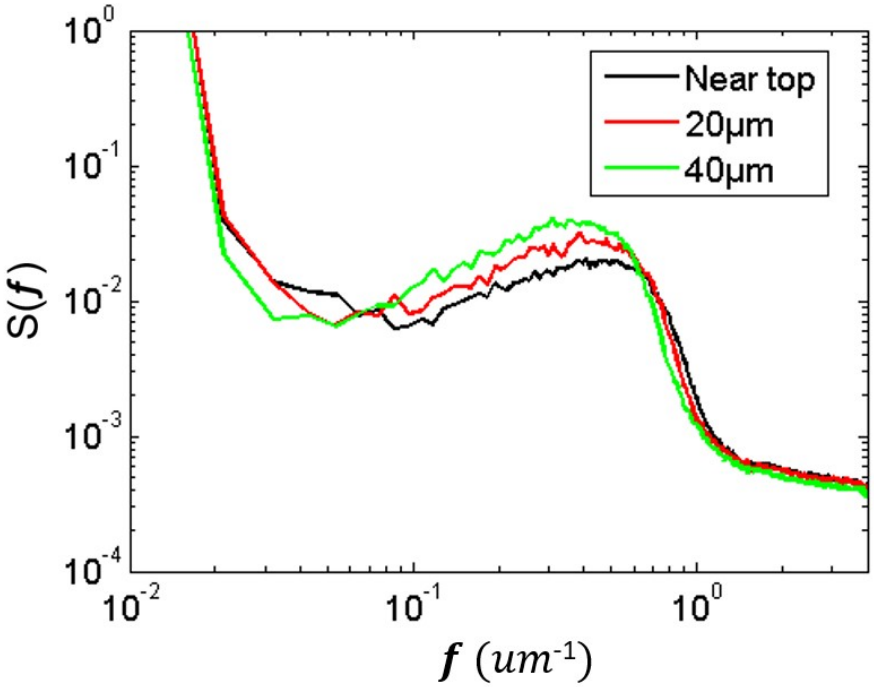

Figure S4. Radially averaged power spectra of VIPS-STRIPS bijel structures at different vertical distance from the top surface in log-log scale.