Electronic Supplementary Material (ESI) for RSC Advances.

Supplementary Information

Mechanical Oscillation of Dynamic Microtubule Rings

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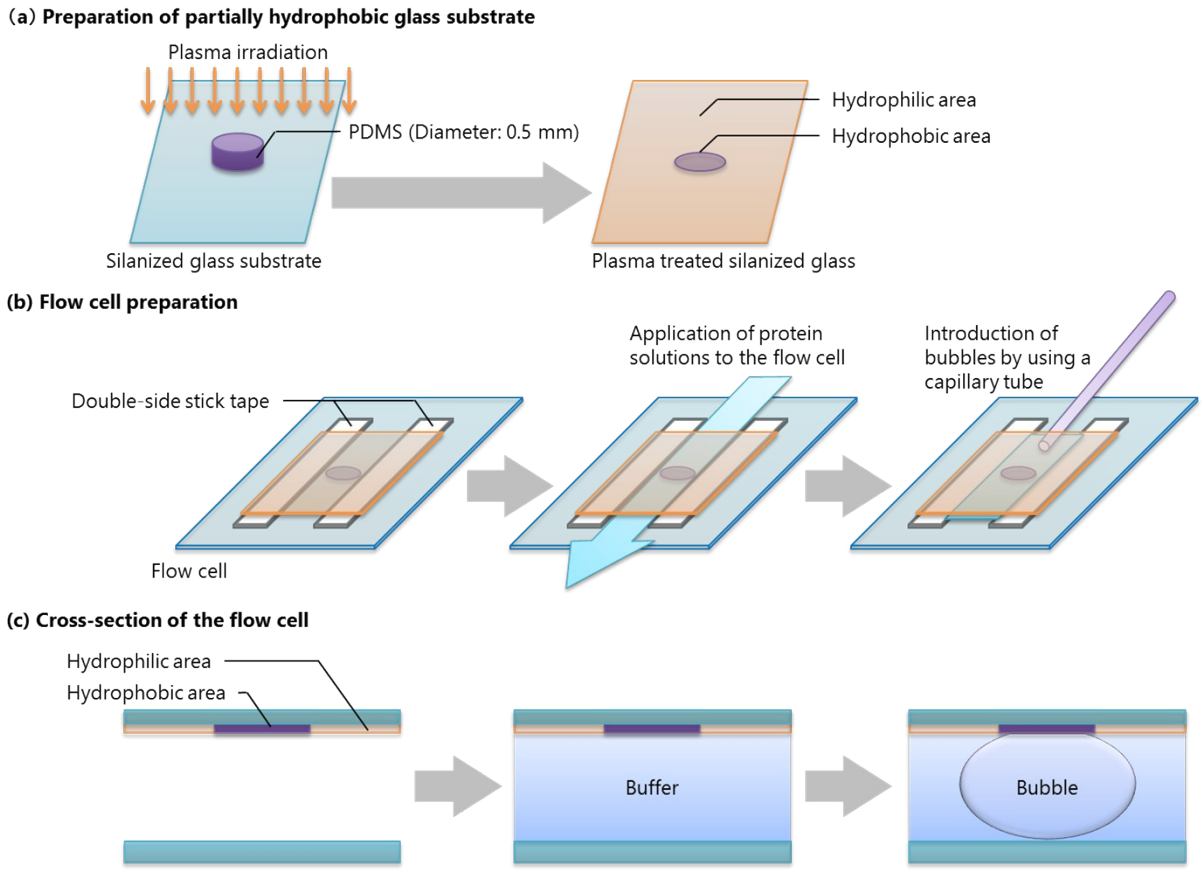
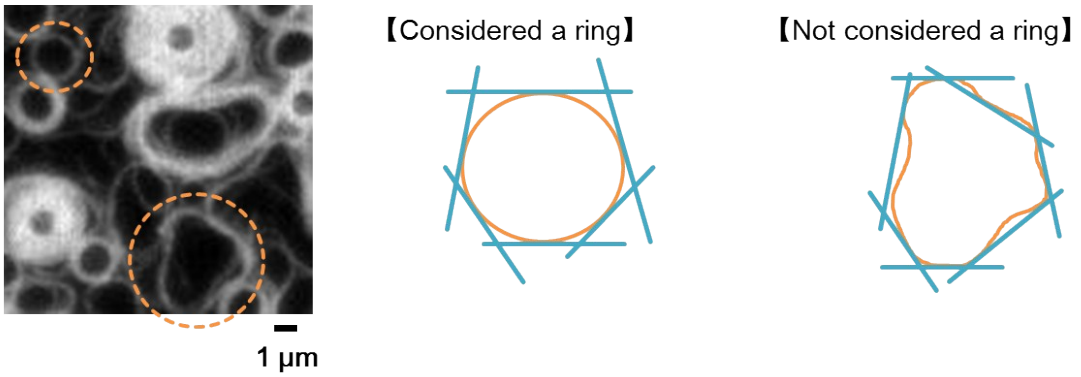


Figure S1: Schematic illustrations showing the preparation of hydrophobic glass substrate (a), preparation of flow cell (b), and cross-section of the flow cell and position of a bubble at the hydrophobic area inside the flow cell (c).

(a) A Tangent to the circle barely touches the circle at a single point.



(b) The value of "Roundness" must be more than 0.75.

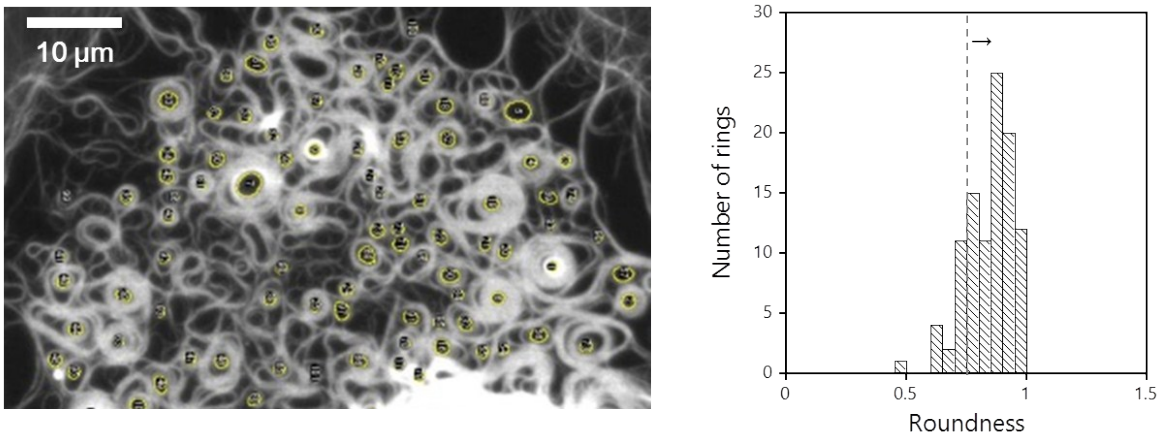


Figure S2: An assembly of MTs was considered a ring based on the two criteria mentioned in (a) and (b).

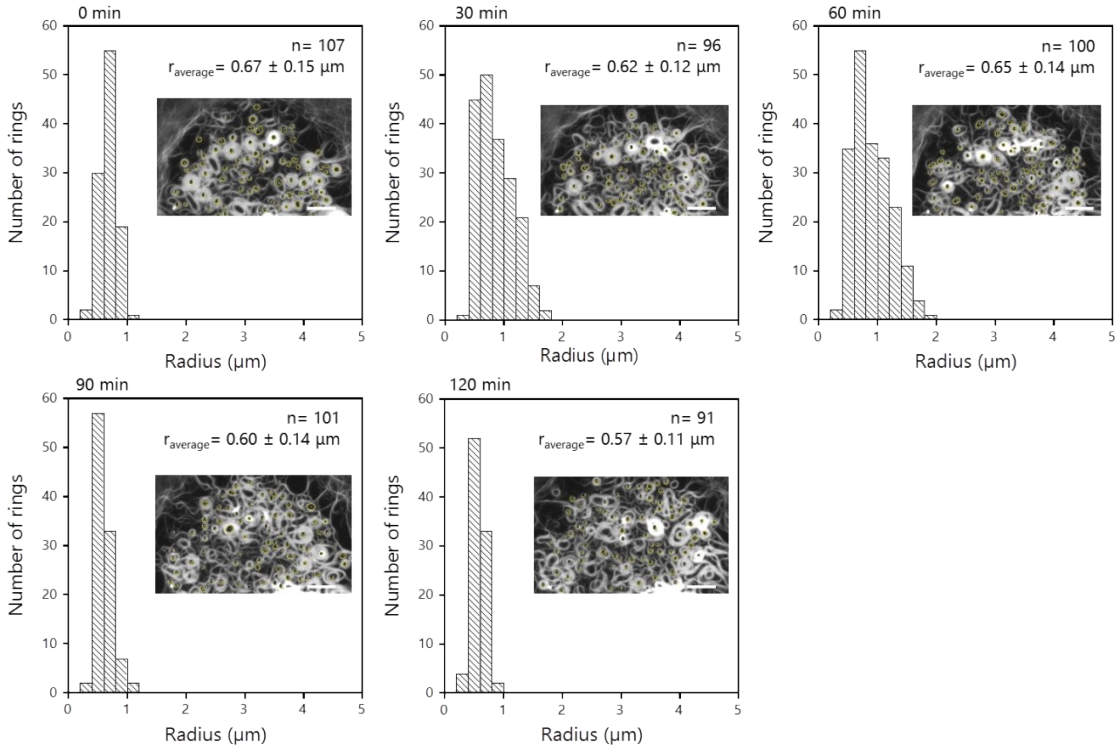


Figure S3: Histograms show the change in size of the MT rings with time. Insets show fluorescence microscopy images of the MT rings for the corresponding time; "n" represents the number of samples considered and, "$r_{average}$" represents the average radius of the MT rings (average±standard deviation). Scale bar: 10 µm.

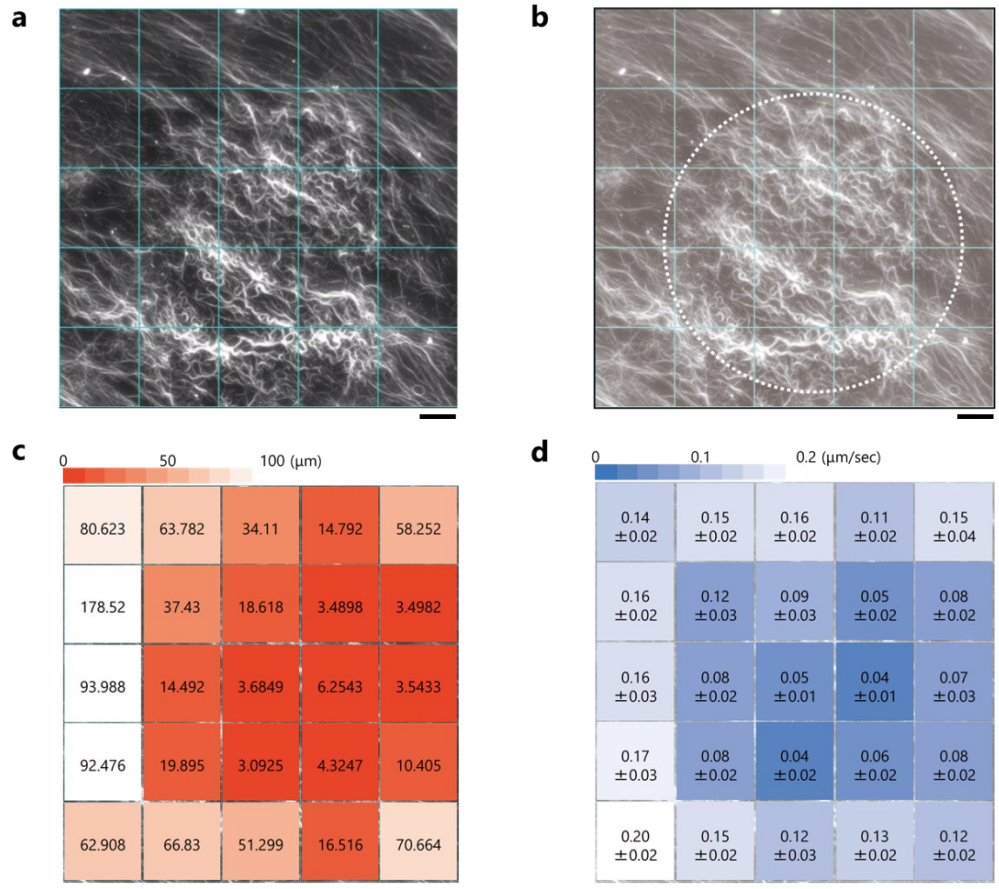


Figure S4: Fluorescence microscopy image of MTs beneath a small bubble whose height was not enough to induce formation of dynamic MT rings (a); position of the bubble is marked by white-dotted line (b); heat map of the persistent length (c) and velocity (d) of MTs at different area beneath the bubble. Scale bar: 10 μm.

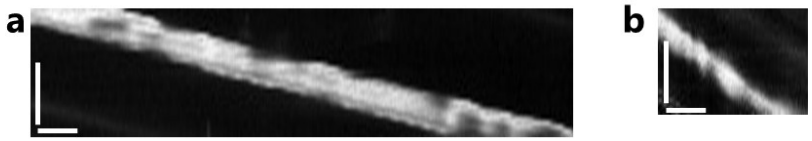


Figure S5: Kymographs of MTs at the outermost (a) and innermost (b) periphery of a MT ring prepared using the streptavidin-biotin interaction. In such a ring, MT filaments are tightly fixed to each other preventing the sliding of the filaments. Scale bar: 3 min (vertical) and 5 μm (horizontal).

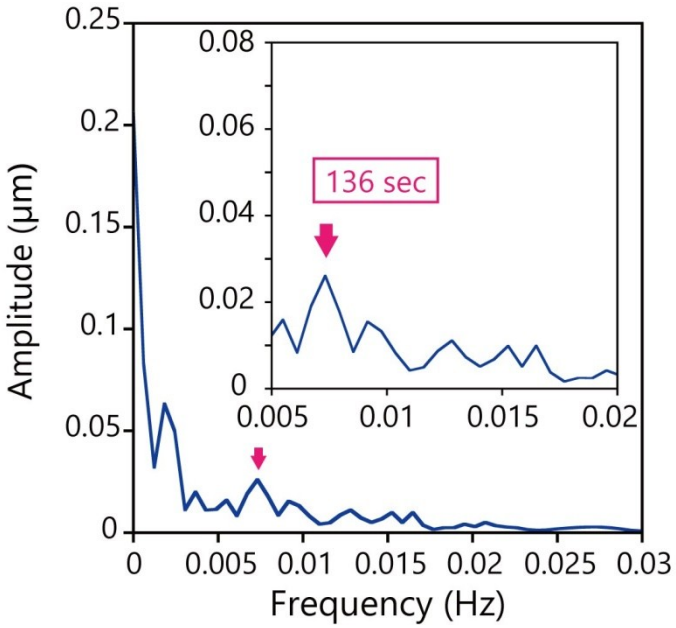


Figure S6: The power spectrum obtained from the Fast Fourier Transformation (FFT) analyses of the ΔD for the oscillation event. A significant peak at 0.007325 Hz (pink arrow) is observed which corresponds to the period of ~136 sec.