Electronic Supplementary Material (ESI) for Materials Advances.

Electrically driven formation and dynamics of Pac-Man solitons in smectic A liquid crystals

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Supplementary Figures

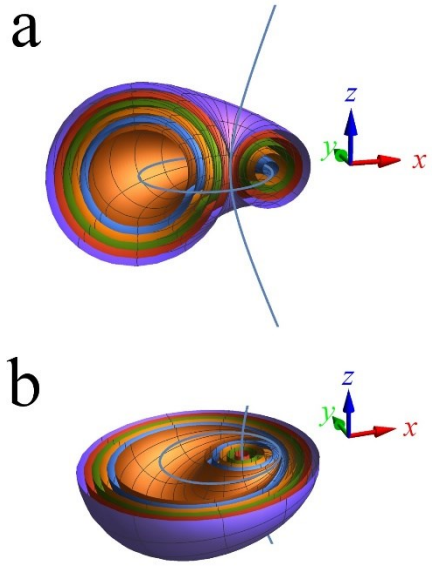

Figure. S1. A stack of three-dimensional Dupin cyclides cut along (a) the *xz* plane and (b) the *xy* plane. The blue lines depict the ellipse and the confocal hyperbola.

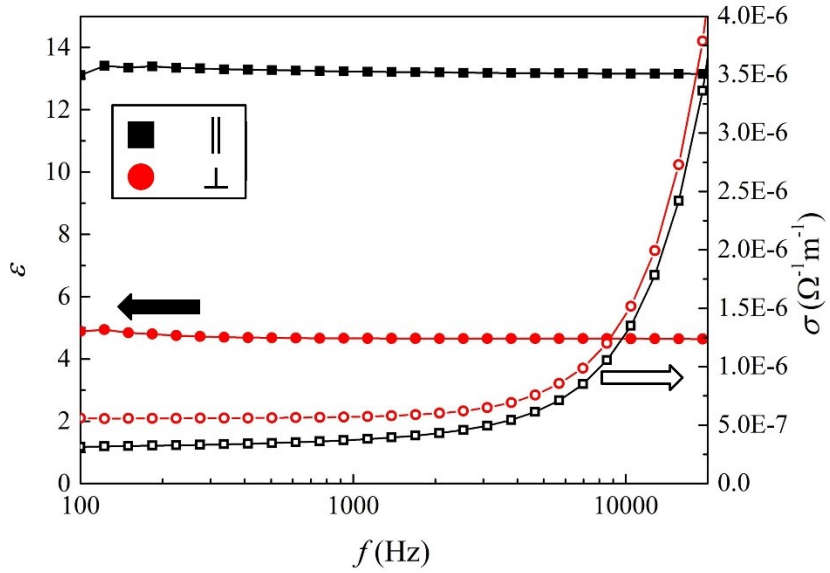

Figure. S2. Frequency dependence of dielectric permittivities (solid symbols) and

conductivities (hollow symbols) of 8CB at T = 34.0 °C, U = 0.1 V.

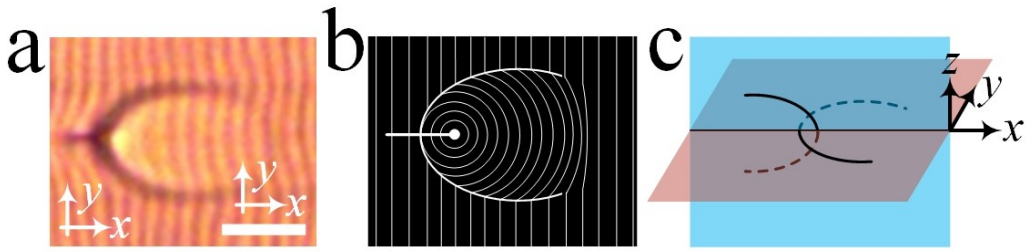

Figure. S3. Schematic structure of three-dimensional Pac-Man soliton. (a) Optical micrograph of a soliton at U = 6.6 V, f = 50 Hz, T = 34.6 °C, scale bar 10 μm. (b) Two-dimensional schematic structure of the soliton in the x-y plane. (c) Three-dimensional schematic locus of the cusps of the soliton.

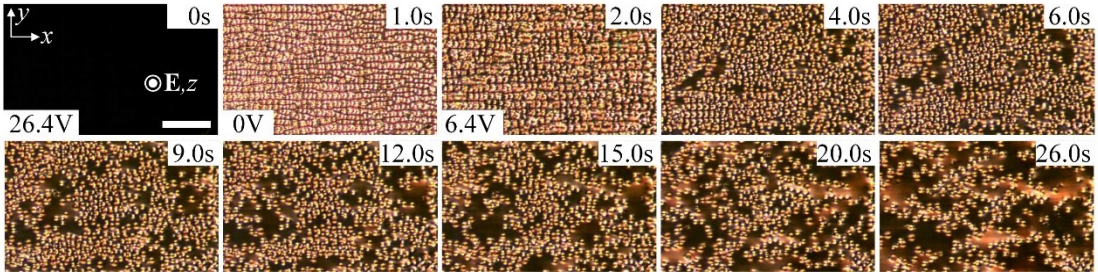

Figure. S4. Time series of micrographs of the dynamic transformation of the Pac-Man solitons from the focal conic domains in the scattering state. U changes from 26.4 V to 0 V to 6.4 V, f = 10 Hz, T = 34.2 °C, scale bar 50 μm.

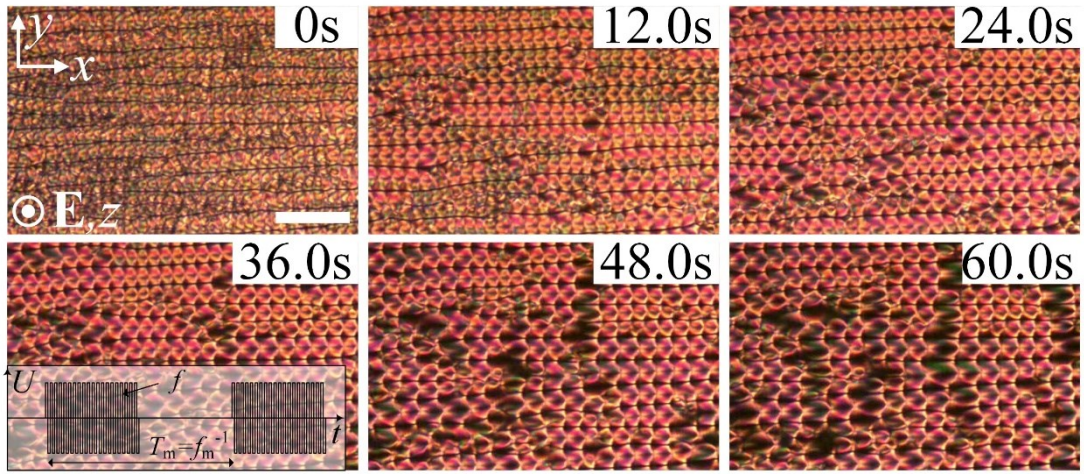

Figure. S5. Time series of micrographs of the dynamic transformation of the scattering state to the periodic soliton array. U = 7.0 V, f = 5 kHz, f_m = 10 Hz, T = 34.6 °C.

Supplementary Movies

Supplementary Movie 1: Pac-Man solitons move along the *x*-axis with a constant speed. U = 6.0 V, f = 2.0 Hz, T = 34.8 °C.

Supplementary Movie 2: Dynamic transformation of a Pac-Man soliton into an edge dislocation and back to a soliton. The voltage is changed between U = 6.4 V and U = 8.0 V, f = 2 Hz, T = 34.6 °C.

Supplementary Movie 3: Dynamic transformation of Pac-Man solitons into edge dislocations. The voltage is gradually increased from U = 5.6 V to U = 7.2 V, and then decreased back to U = 5.6 V. f = 10 Hz, T = 34.6 °C.

Supplementary Movie 4: Dynamic motion of edge dislocations. U = 6.0 V, f = 2 Hz, T = 34.4 °C.

Supplementary Movie 5: A Pac-Man soliton splits into two solitons. U = 6.4 V, f = 2 Hz, T = 34.6 °C.

Supplementary Movie 6: Nucleation of Pac-Man solitons at a surface imperfection. U = 8.0 V, f = 20 Hz, T = 34.0 °C.

Supplementary Movie 7: Disappearance of Pac-Man solitons at the ITO electrode. U = 6.8 V, f = 2 Hz, T = 34.1 °C.

Supplementary Movie 8: Emergence of edge dislocations at the ITO electrode. U = 6.8 V, f = 2 Hz, T = 34.1 °C.

Supplementary Movie 9: A chain of three Pac-Man solitons moving at a constant velocity. U = 6.6 V, f = 50 Hz, T = 34.6 °C

Supplementary Movie 10: Linear chains of Pac-Man solitons moving on discontinuity walls. U = 8.0 V, f = 10 Hz, T = 34.0 °C.

Supplementary Movie 11: Two Pac-Man solitons collide and pass through each other. U = 5.6 V, f = 2 Hz, T = 34.8 °C.

Supplementary Movie 12: Two Pac-Man solitons collide head-on. U = 8.0 V, f = 10 Hz, T = 34.0 °C.

Supplementary Movie 13: A Pac-Man soliton collides with a micro-particle (R_P = 3.0 μm) and sticks to it. U = 5.4 V, f = 10 Hz, T = 34.4 °C.

Supplementary Movie 14: A Pac-Man soliton collides with a micro-particle (R_P = 3.0 μm) and moves away from it. U = 5.4 V, f = 10 Hz, T = 34.4 °C.

Supplementary Movie 15: Nucleation of Pac-Man solitons on a micro-particle (R_P = 1.5 μm). U = 7.6 V, f = 10 Hz, T = 33.5 °C.

Supplementary Movie 16: Transformation of dynamic Pac-Man solitons from scattering state. Voltage is changed from U = 26.4 V to U = 0 V and then to U = 6.4 V, f = 10 Hz.

Supplementary Movie 17: Dynamics of Pac-Man solitons at low temperatures. U = 18.0 V, f = 10 Hz.