Supporting Information

Adaptive particle patterning in the presence of active synthetic nanomotors

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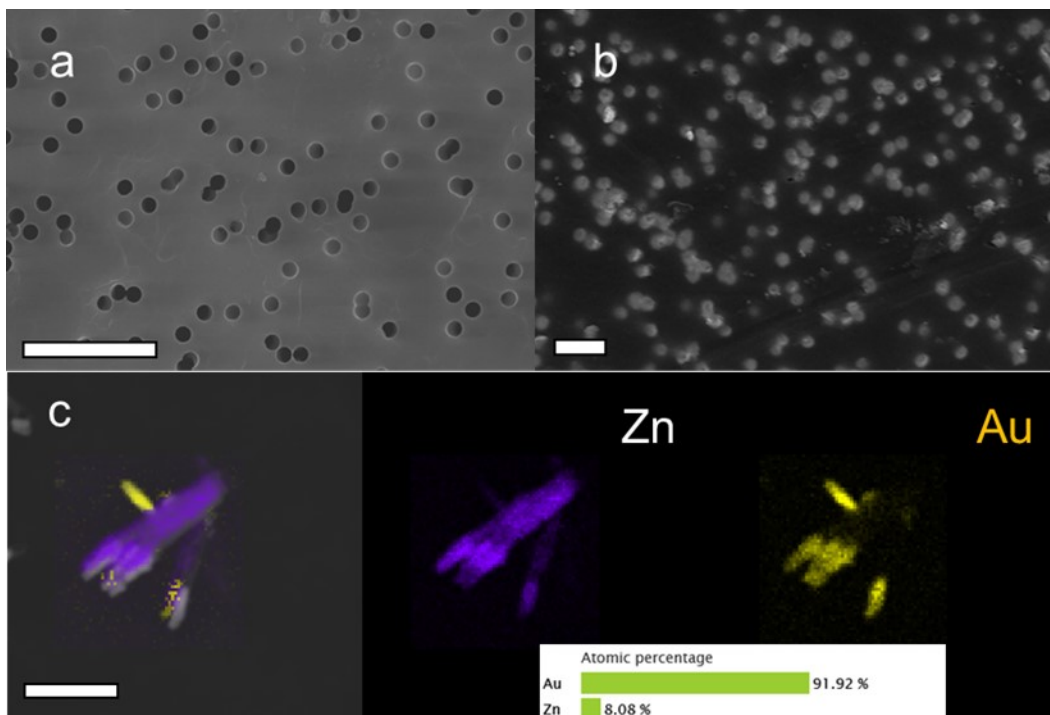**Corresponding author. Email:** pengf26@mail.sysu.edu.cn

Figure S1 (a) SEM image of the pores on the polycarbonate membrane. (b) SEM image of polycarbonate film after Au-Zn deposition. (c) SEM image and EDS image of the Au-Zn nanomotor.
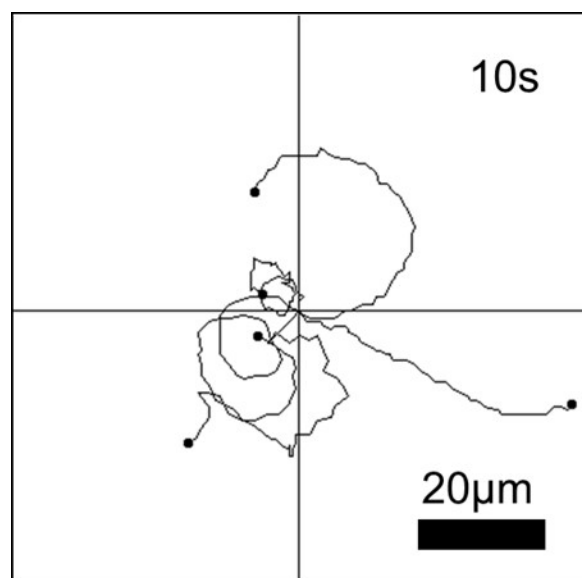
Figure S2 The trajectory of the nanomotor propelled in DI water for 10 seconds.
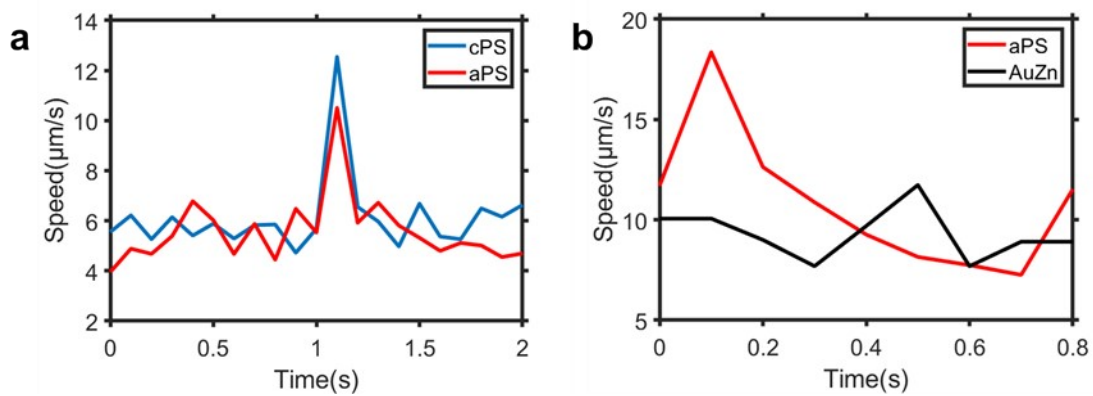
Figure S3 (a) Speed analysis of amine PS beads and carboxyl PS beads attracted by Au-Zn nanomotors. (b) The migration speed diagram of amine PS and Au-Zn nanomotors when chasing occurs.
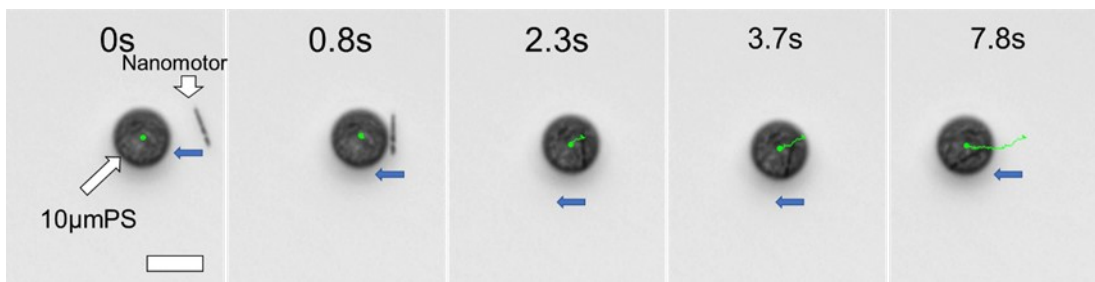
Figure S4 The moving nanomotor combines with the 10 μm PS beads into quasi-stable complex and move, scale bar 10 μm.
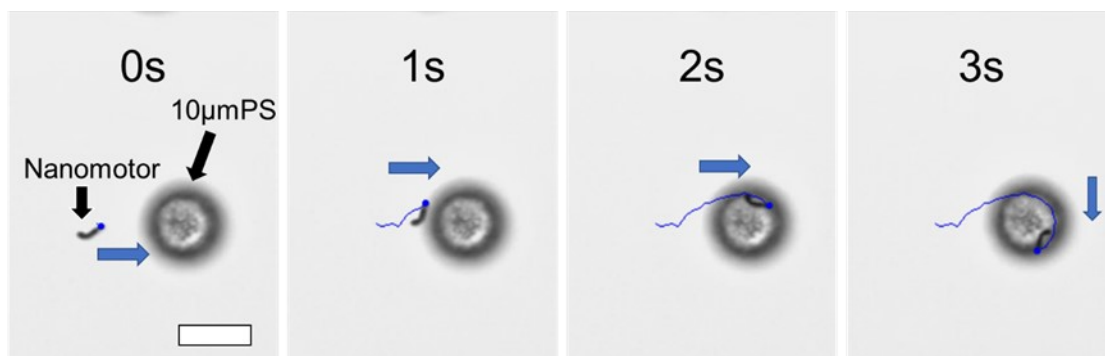
Figure S5 The nanomotor moves in a circle along the edge of the 10 μm PS bead, scale bar 10 μm.
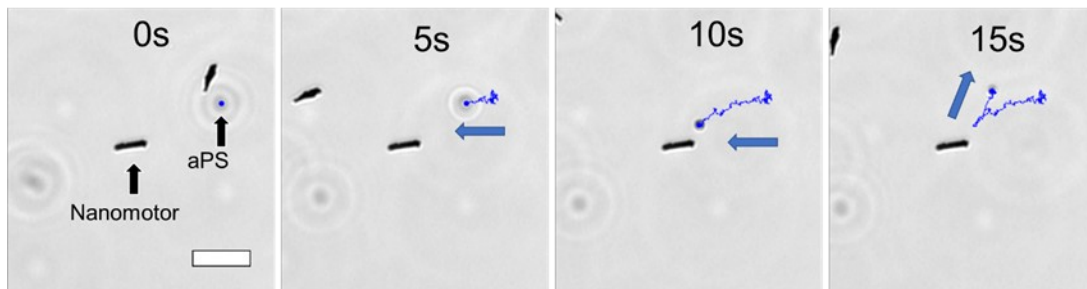
Figure S6 Au-Zn pause on substrate. The amine PS beads from right first approached and then repulsed away from the nanomotor, scale bar 10 µm.
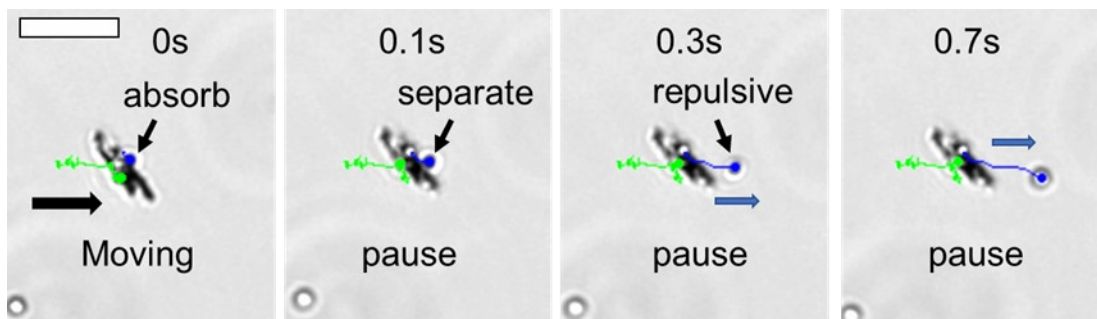
Figure S7 The interaction mode between nanomotor and amine PS beads switched from attraction to repulsion, scale bar 10 μm.

Table S1 Velocity of Au-Zn nanomotor in DI water.

	Min	Max	Mean	Std Dev
Velocity [μm/sec]	4.5	9.1	6.4	1.45

Movie S1.

Video S1, self-propulsion of Au-Zn nanomotor;

Video S2, Au-Zn nanomotor generating blue zinc ion field in presence of fluorescent probe Zinquin;

Video S3, cPS is adsorbed by the Au-Zn nanomotor;

Video S4, aPS is adsorbed by the Au-Zn nanomotor;

Video S5, aPS chasing Au-Zn nanomotor;

Video S6, Au-Zn nanomotor turn around after bound with aPS;

Video S7 Au-Zn nanomotor obtains different movement directions due to the different adsorption positions of the PS beads;

Video S8, aPS repel by Au-Zn nanomotor;

Video S9, skeleton pattern at negative substrate;

Video S10, aPS absorb by Au-Zn nanomotor at positive substrate;

Video S11, cluster pattern at positive substrate.