Electronic Supplementary Information

Acoustically Propelled Nanoshells

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1. Supporting Video Description.

Video S1. Nanoshell propulsion vs. Tracer particles dragged by the fluid.

Video S2. Reversible "On-Off" ultrasound propulsion of nanoshells.

Video S3. Effect of density on particle behavior.

Video S4. Nanoshell Magnetic Guidance.

Video S5. Shape effect on nanoshell directionality.

Video S6. Nanoshell vs. nanowire cargo towing.

Video S7. Nanoshell "On the fly" capture and transport of multiple cargoes.

Video S8. Nanoshell propulsion inside live cell.

2. Supporting Figure.

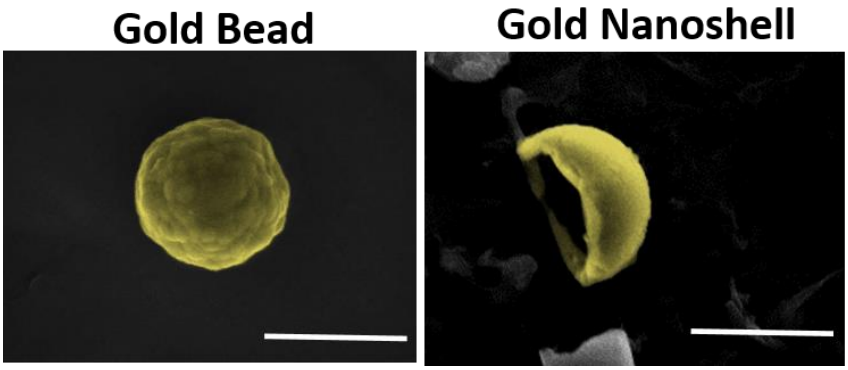

Figure S1. SEM images illustrating the shape of gold beads and gold nanoshell, of the same size. The difference in shape asymmetry leads to different propulsion behavior. Scale bar, 1 μm.

The effect of relative shape asymmetry was further supported by testing if gold beads (1 μm diameter) with a rough surface display efficient autonomous propulsion. Most of these beads were dragged by the fluid flow and did not display autonomous propulsion. These data support the essential role of the relative shape asymmetry in acoustic propulsion. A similar effect is presented in the cargo towing experiments involving nanowires and nanoshells motors. When the nanowire captures the iron oxide magnetic bead, most of the relative asymmetry located at one end of the nanowire is lost; in comparison, when the nanoshell captures the iron oxide magnetic bead, the new shape generated maintains a larger degree of relative asymmetry.