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Building a dynamic cell from the bottom up[1] VIVA R. HOROWITZ, THOMAS G. DIMIDUK, Department of Physics, Harvard University, IREP GOZEN, School of Engineering and Applied Sciences, Harvard University, YUE N. REN, Harvard University, VINOTHAN N. MANOHARAN, School of Engineering and Applied Sciences, Harvard University — We aim to understand cellular processes, particularly intracellular transport, at a physical level by building simple, well-controlled systems that mimic the functions of a cell. We have created a simple artificial cell using a bilayer phospholipid vesicle containing Janus swimmers as microscale motors. These Janus swimmers are propelled by the catalytic breakdown of hydrogen peroxide on their platinum hemispheres. We encapsulate these Janus swimmers in the interior of the artificial cell. We investigate the superdiffusive motion using multimodal imaging tools, including digital holography and fluorescence, to shed light on how the dynamics of Janus swimmers depends on the confinement. These dynamics and transport processes may prove necessary to sustain gene expression, growth, and reproduction in future artificial cells.

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