

Description of Additional supplementary files

Supplementary Movie 1: Reversible actuation of PI actuator driven by UV light.

Supplementary Movie 2: Robot crawling forward on a ratcheted substrate upon on-off UV light illumination cycles.

Supplementary Movie 3: Fluorescent robot crawling forward in dark.

Supplementary Movie 4: Robot crawling up a ratcheted substrate at a 15° incline.

Supplementary Movie 5: Fluorescence patterned actuator simultaneously showing reversible actuation and exhibiting pattern upon turning on and off the UV light.

Supplementary Movie 6: Actuator performing different motions when stimulated at different locations.

Supplementary Movie 7: Actuator showing the ability of weightlifting.

Supplementary Movie 8: Actuator showing the ability of throwing object.

Supplementary Movie 9: Actuator showing the ability of transporting object.

Supplementary Movie 10: Actuator showing the ability of leaping