Electronic Supporting Information

Light-driven microrobots: capture and transport of bacteria and microparticles in the fluid medium

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1. Guide to supplementary Videos:

Video S1: Video shows the movement of microrobots in aqueous hydroquinone/ benzoquinone solution under low-intensity UV light illumination. Each panel corresponds to a different concentration. For each video panel, the concentration of the solution is shown in the black stripes. The video plays at 1X speed.

Video S2: Video shows the propulsion behavior of microrobots corresponding to different photocatalytic film (TiO_2) thicknesses. Microrobots corresponding to different film thicknesses were immersed into the 50:5 mM concentration of hydroquinone: benzoquinone solution and irradiated with low-intensity UV light. For each video panel, the concentration of the solution is shown in the black stripes. The video plays at 1X speed.

Video S3: Video shows the capturing of dummy cargo (passive silica) particles by microrobot with steerability capacity by the application of an external uniform magnetic field (50 Gauss). The on/off states of field and light are highlighted in the video. The experiment was carried out in 50:5 mM hydroquinone/benzoquinone (HQ/BQ) solution. The video is playing at 4X speed.

Video S4: Video shows the capturing and transportation of biological sample E. coli by microrobot under the irradiation of low intensity UV light. The experiment was carried out in 50:5 mM hydroquinone/benzoquinone (HQ/BQ) solution. The video is playing at 4X speed.

2. Supplementary figure description

2.1 XRD and UV-Vis analysis:

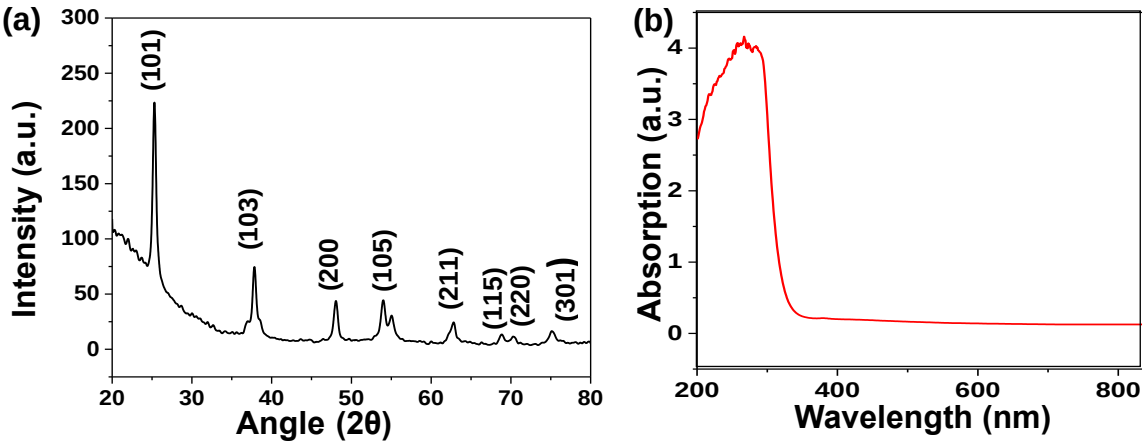

Fig. S1 The characterization of photocatalytic layer. (a) XRD peaks of TiO_2 confirm the formation of anatase phase. (b) Absorption spectra shows the absorbance in region matching the bandgap energy (equivalent to ≤ 380 nm wavelength) of the TiO_2.

2.2 SEM and EDAX analysis of modified microrobots:

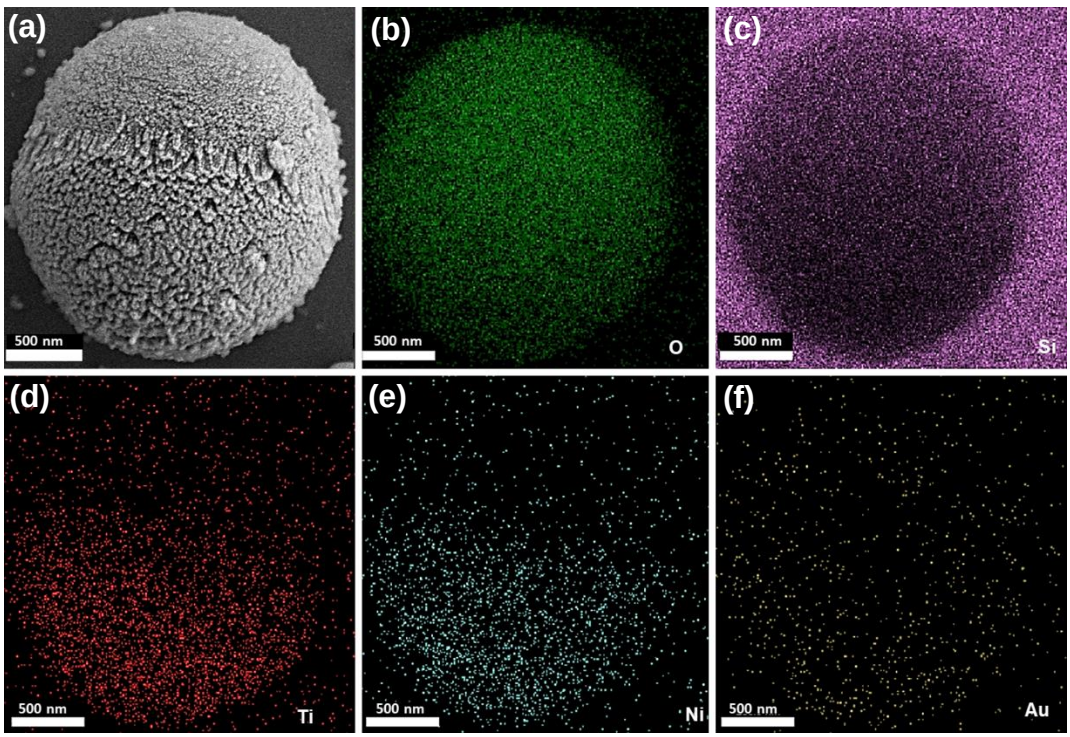

Fig. S2 Morphological study of modified microrobot. (a) SEM image and (b-f) EDAX mapping of modified microrobot shows elemental distribution of coating materials and confirms the Janus shape.

2.3 Speed comparison data:

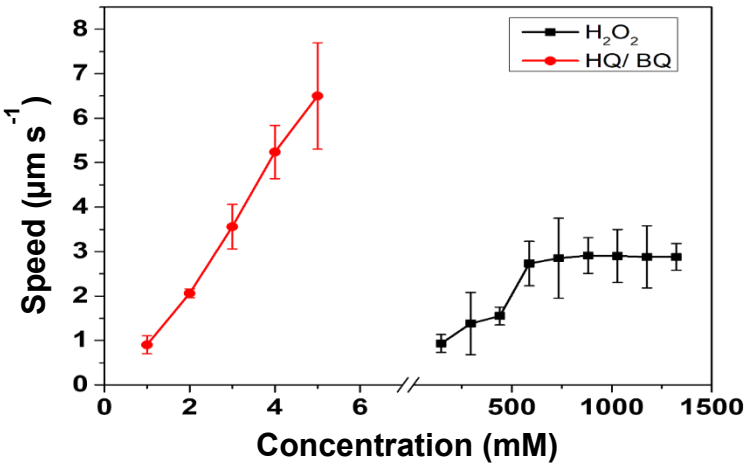

Fig. S3 Speed Comparison data show the higher propulsion speed of microrobots even at lower concentrations of HQ/ BQ than the toxic peroxide fuel. X-axis for biocompatible fuel HQ/ BQ represents the value for BQ concentration where the ratio for HQ/BQ is maintained at 10:1.

2.4 Fluorescence image of bacteria:

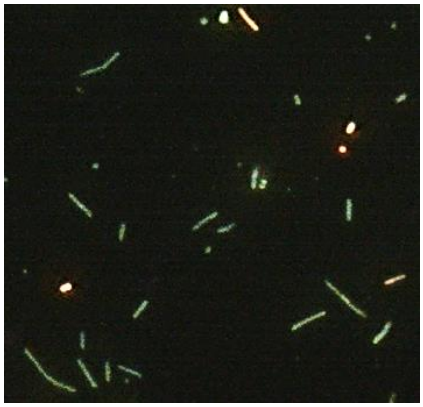

Fig. S4 Fluorescence image of bacteria in HQ/BQ fuel under no light illumination. The image was taken 30 minutes after adding the bacteria into the fuel medium. The green and red color show the live and dead bacteria respectively.

2.5 Zeta Potential Measurements:

Sample (in aqueous HQ/BQ, 50/5 mM)	Zeta Potential (mV)
E. coli	-28.8
SiO_2 particle	-55.5
Modified microrobot	-27.1

Table S1: The zeta potential measurements of the microrobots, silica and E. coli.