

Electronic Supporting Information (ESI)

Lab-on-a-micromotor: catalytic Janus particles as mobile microreactors for tailored synthesis of nanoparticles

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Supporting videos

SI Video 1. Propulsion of PCL-PtNPs-Fe₃O₄ NPs microreactors in peroxide solutions and the control of its direction using an external magnetic field.

SI Video 2. Propulsion and fluorescent emission of the CdS microreactors in peroxide solutions.

SI Video 3. Propulsion of gold nanoparticles microreactors in peroxide solutions in the absence and presence of surfactant.

Supporting figures

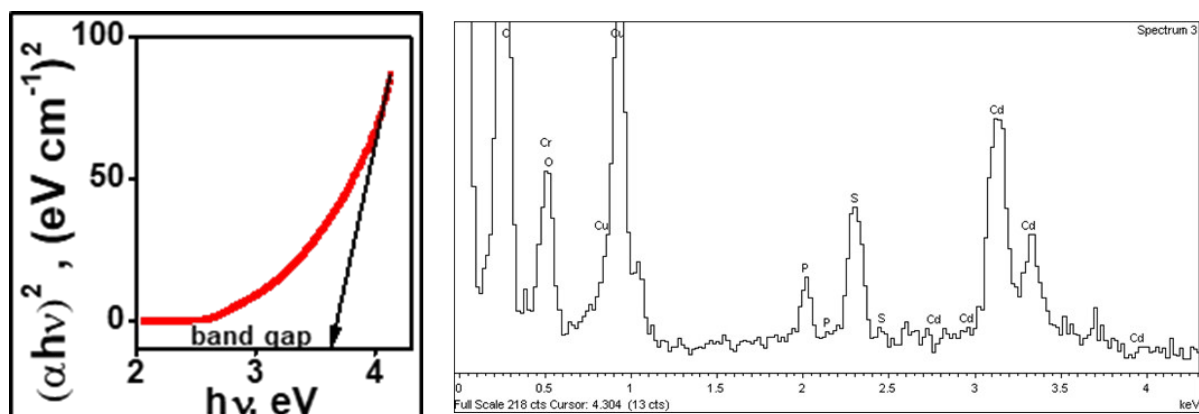


Figure S1. CdS quantum dots characterization: TAUC plot and EDX mapping.

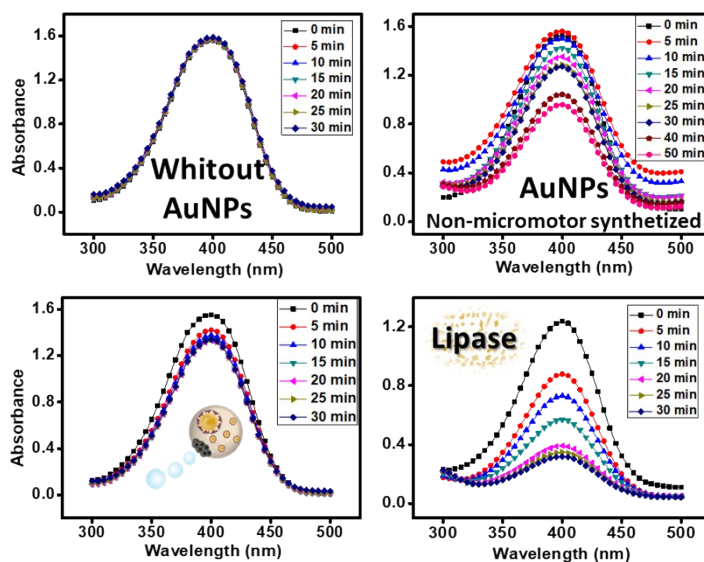


Fig. S2. Tailored synthesis of gold nanoparticles using Janus microreactors: UV/VIS spectra of 4-nitrophenol catalytically reduced by free AuNPs (non-micromotor synthesized), in the absence of gold nanoparticles, using moving micromotors containing the AuNPs and after micromotor degradation with lipase and release of the as prepared gold nanoparticles.

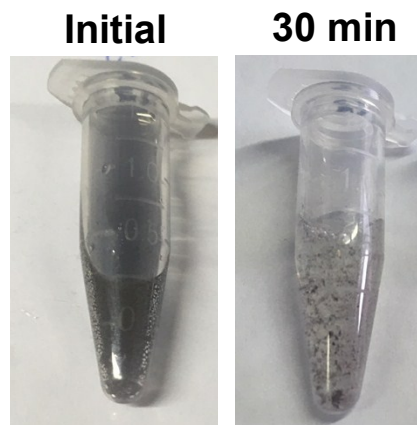


Fig. S3. Photographs of a solutions containing 5 mM gold (III) chloride trihydrate, 3 % sodium citrate and 15 % hydrogen peroxide (total volume, 800 μ L) before (left) and after 30 min (right) mixing in the absence of microreactors.

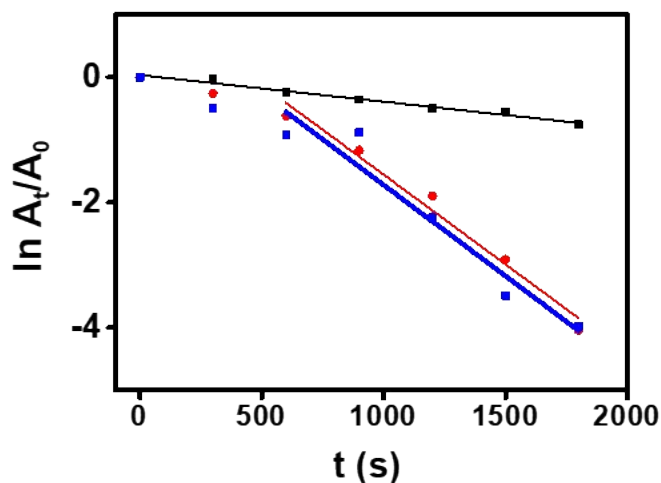


Fig. S4. Kinetic curves of 4-nitrophenol reduction by sodium borohydride catalyzed by AuNPs synthesized with the moving microreactors at 100 °C (black) and room temperature, 25 °C (citrate motors, red; Au motors, blue).

Fig. S2 shows several control experiment which reveal the feasibility of the 4-nitrophenol assay to check the catalytic activity and adequate generation of the AuNPs using the moving reactors. Thus, as can be seen in the plot designed as AuNPs, under the presence of such particles, a rapid decrease in the initial absorbance signal of 4-nitrophenol was observed due to its conversion to 4-aminophenol. In contrast, in the absence of AuNPs (without AuNPS plot), the absorbance signal remains constant, indication that 4-nitrophenol is not reduced and revealing the crucial role of the AuNPs as catalyst. In addition, plots at the bottom part shows that catalytic activity of the nanoparticles is retained in the microreactor, and that the degradation of the micromotor body with lipase is required to adequately monitor the catalytic activity and characterize the overall process.