Electronic Supplementary Material (ESI) for RSC Advances.

Bubble-propelled tri-metallic microcaps as functional catalytic micromotors

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Supplementary Information

1. Description of supporting videos

Video S1. Random motion of microcap motor in the absence of magnetic field.

Video S2. Directed motion of microcap motor using an external magnet.

Video S3. Capture and transport of an oil droplet by alkanethiol modified microcap motor.

Video S4. Unmodified microcap motors encountering oil droplets during motion.

2. Experimental details:

Materials and equipment:

Silica particles and sodium hydroxide were purchased from Alfa Aesar (catalogue No. 45830) and Sigma Aldrich, respectively. 1-dodecanthiol was obtained from Sigma Aldrich. Emitech K675X sputter coater and Cressington 208HR sputtering systems were used to deposit Ni and Pt/Au layers, respectively. Video sequences were recorded at 25 frames per second using Olympus BX51 microscope (5X and 10X objective) and a Thorlabs DCC1645C Compact CMOS camera. Microcaps were characterized by using Hitachi S4800 Field Emission-Scanning Electron Microscope equipped with an energy dispersive X-ray spectrometer.

Video editing and motion tracking:

VirtualDub 1.10.4 was used to edit videos and FiJi free software was used to track speeds of microcap motors and to extract images.

Microfluidic device fabrication:

Microfluidic chip was fabricated by soft lithography and replica molding. A mixture of PDMS Sylgard 184 was prepared by mixing polymer and curing agent in the ratio of 10:1. After degassing in a desiccator and

pouring over the master mold, the sample was cured at 65° C for 3 h, cooled down and peeled-off from the master. After punching the holes, PDMS and a cleaned glass slide were treated with oxygen plasma for 1 min to activate the surface. Afterwards, the PDMS piece was irreversibly bounded to the glass slide.

3. EDX analysis:

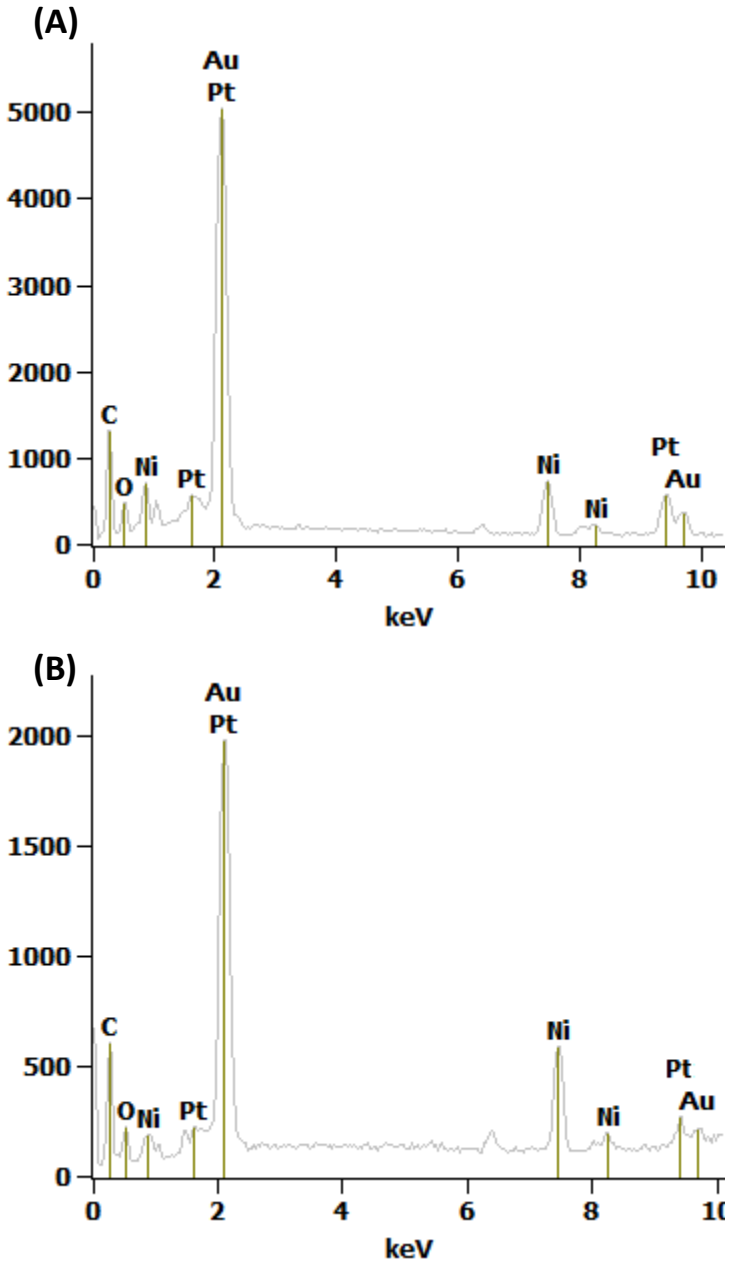

Fig. S1 EDX analysis of, (A) Convex-Pt and (B) concave-Pt microcaps.