Micromotors with thermoresponsive polyphosphazene on/off switch

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The last decades of improvements in materials science and nanotechnology have led to the design of powerful self-propelled micro/nanoscale motors [1], able to show motion in different fluids by utilizing an energy source or chemical fuel such as hydrogen peroxide. Precise movement manipulations, like the control over the velocity and the direction, are still limited but particularly desirable [2]. Therefore, an improvement in the micromotors design is the incorporation of stimuli-responsive controls. Here we report on micromotors based on mesoporous silica particles coated with "bottle-brush" polyphosphazene, possessing lower critical solution temperature (LCST) characteristics. Switching the polymer coating in a narrow temperature window (20-25°C) between the swollen and collapsed state allows to control the access of fuel (H_2O_2) to the cobalt(II) bipyridinato catalyst sites within the silica particles. Our system represents one of the first proof-of-concepts for microengines with a reversible thermo-responsive on/off switch.

[1] Wang H., Pumera M., *Chem. Rev*., **2015**, *115*, 8704–8735.

[2] S. Balasubramanian, D. Kagan, K. M. Manseh, P. Calvo-Marzal, G. U. Flechsig, J. Wang, *Small* **2009**, 5, 1569–1574; b) X. Ma, X. Wang, K. Hahn, S. Sánchez, *ACS Nano* **2016**, 10, 3597–3605.