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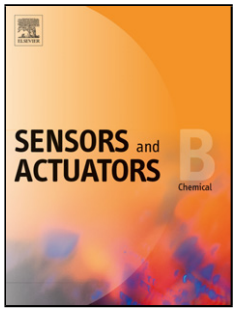


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PII: S0925-4005(17)30283-6
DOI: http://dx.doi.org/doi:10.1016/j.snb.2017.02.056
Reference: SNB 21787

To appear in: *Sensors and Actuators B*

Received date: 22-11-2016
Revised date: 25-1-2017
Accepted date: 10-2-2017

Please cite this article as: J. Wang, J.C.T. Eijkel, M. Jin, S. Xie, D. Yuan, G. Zhou, A. van den Berg, L. Shui, Microfluidic Fabrication of Responsive Hierarchical Microscale Particles from Macroscale Materials and Nanoscale Particles, *Sensors and Actuators B: Chemical* (2017), http://dx.doi.org/10.1016/j.snb.2017.02.056

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# Microfluidic Fabrication of Responsive Hierarchical Microscale Particles from Macroscale Materials and Nanoscale Particles

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Academic Editor: name

Received: date; Accepted: date; Published: date

**Abstract:** Stimuli-responsive microparticles have been widely applied in sensors, actuators, chemical and biomedical analysis, and optoelectronic devices. Microfluidic technology has been demonstrated as a powerful top-down tool to create hierarchical microparticles with exquisite control over size, uniformity, morphology, structure and chemical composition. With the exploration of materials, various stimuli-responsive materials have been obtained, responding to magnetic, thermal, electrical, light and chemical stimuli. Self-assembly of nanoparticles is a quick bottom-up approach for the generation of functional materials with collective optical, electrical and magnetic properties. By combining macroscale materials and nanoscale particles using microfluidic technology, smart microparticles can be fabricated, possessing the responsive properties from the composing materials, the high surface-to-volume ratio and enhanced field effect from self-assembled nanostructures, and the advantages from microfluidics for controlling composition and structure of monodisperse microparticles. Therefore, better controlled physical and chemical properties and more sensitive and efficient performance can be achieved. In this



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