Polymer-mediated microcontact printing: A method to fabricate patchy particles using low molecular-weight compounds as ink

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Anisotropically functionalized, *i.e.* "*patchy*", particles promise highly interesting applications due to their asymmetric characteristics, which can for instance guide their assembly to complex, hierarchical superstructures [1, 2]. Among a rich portfolio of methods to fabricate patchy particles, microcontact printing (µCP) constitutes a facile, inexpensive, and straightforward technique suitable for upscaling (Fig. 1) [3, 4].

For these reasons, we developed a µCP routine to introduce patches of low molecular-weight compounds on silica (SiO_2) microparticles [5]. Printing of low molecular weight-inks (LMWIs) thereby remains a demanding task due to the high diffusive mobility of the small molecules, which can result in uncontrolled ink-flow at the particle surface, hence, yielding rather poorly defined patches. We address this issue by employing modified stamps within the µCP process to regulate the ink diffusion. Here, we utilize functional polymers as brush-like stamp modifiers to direct the transfer of the LMWI from the stamp to the particle surface.

This contribution aims for the presentation of a concept about polymer brush-mediated µCP of LMWI compounds onto SiO_2 microparticles with particular emphasis on the characterization of the resulting particle patches.

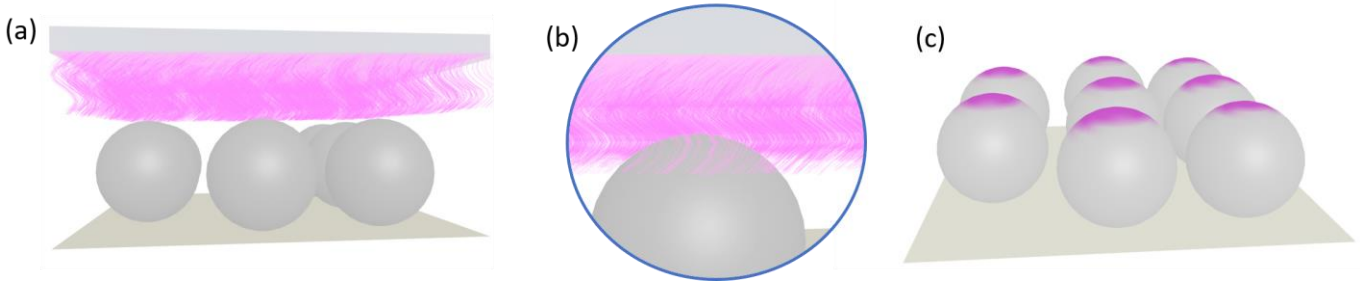

Figure 1. Schematic overview over the described microcontact printing process: (a) An inked, polymer brush-modified stamp approaches the particle monolayer; (b) Direct contact between particle surface and stamp facilitates the ink transfer mediated by the presence of the polymer; (c) Release of the patchy particles upon the removal of the stamp.

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