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In the last years a large variety of drug delivery systems have been developed to improve bioavailability of therapeutics in oral administration. An increasing interest has arisen in reservoir-based microdevices designed for active ingredients like water insoluble compounds and fragile biomolecules. Such microdevices are designed to protect the active ingredient against degradation and deactivation, and to allow cytoadhesion and unidirectional drug release. There are few works which optimize the drug loading step and often therapeutics are dosed in the microdevices through laborious and time consuming procedures. This work proposes an effective loading technique for a poorly soluble model drug in microcontainers, by combining inkjet printing and supercritical fluid impregnation. Well defined quantities of poly(vinyl pyrrolidone) (PVP) solutions are dispensed into microcontainers by inkjet printing with a quasi-no-waste performance. Then ketoprofen is impregnated in the polymer matrix by using supercritical carbon dioxide (scCO₂) as loading medium. The amount of polymer is controlled by the volume and the number of droplets of dispensed polymer and drug loading is tuned by varying the impregnation parameters. Compared to solid dispersions of the same drug and polymer, scCO₂-impregnated microcontainers exhibit a more reproducible drug loading and a faster dissolution rate of the active compound which allows drug release to be modulated. The combination of these loading techniques potentially allows the high throughput fabrication of microdevices for oral drug delivery with a safe and solvent-free solution. © 2013 Published by Elsevier B.V.

General information
State: Published
Organisations: Department of Micro- and Nanotechnology, Nanoprobes, University of Copenhagen
Contributors: Marizza, P., Keller, S. S., Müllertz, A., Boisen, A.
Pages: 1-9
Publication date: 2014
Peer-reviewed: Yes

Publication information
Journal: Journal of Controlled Release
Volume: 173
Issue number: 1
ISSN (Print): 0168-3659
Ratings:
BFI (2018): BFI-level 2
Web of Science (2018): Indexed yes
BFI (2017): BFI-level 2
Scopus rating (2017): CiteScore 7.9 SJR 2.684 SNIP 1.802
Web of Science (2017): Impact factor 7.877
Web of Science (2017): Indexed yes
BFI (2016): BFI-level 2
Scopus rating (2016): CiteScore 7.56 SJR 2.463 SNIP 1.85
Web of Science (2016): Impact factor 7.786
BFI (2015): BFI-level 2
Scopus rating (2015): CiteScore 8.11 SJR 2.738 SNIP 2.074
Web of Science (2015): Impact factor 7.441
Web of Science (2015): Indexed yes
BFI (2014): BFI-level 2
Scopus rating (2014): CiteScore 6.86 SJR 2.438 SNIP 2.092
Web of Science (2014): Impact factor 7.705
Web of Science (2014): Indexed yes
BFI (2013): BFI-level 2
Scopus rating (2013): CiteScore 6.31 SJR 2.441 SNIP 2.023
Web of Science (2013): Impact factor 7.261
ISI indexed (2013): ISI indexed yes
Web of Science (2013): Indexed yes
BFI (2012): BFI-level 2
Scopus rating (2012): CiteScore 5.84 SJR 2.454 SNIP 2.075
Web of Science (2012): Impact factor 7.633
ISI indexed (2012): ISI indexed yes