

Lab on a Chip

Supplementary Information

Title: Biodegradable microcontainers – towards real life applications of microfabricated systems for oral drug delivery

Authors: Zarmeena Abid*^{a,b}, Sophie Strindberg^{a,e}, Madeeha M. Javed^{a,b}, Chiara Mazzoni^{a,c}, Lukas Vaut^{a,c}, Line Hagner Nielsen^{a,c}, Carsten Gundlach^d, Ritika Singh Petersen^{a,b}, Anette Müllertz^{a,d}, Anja Boisen^{a,c}, Stephan S. Keller^{a,b}

a. The Danish National Research Foundation and Villum Foundation's Center for Intelligent Drug Delivery and Sensing Using Microcontainers and Nanomechanics (IDUN)

b. National Centre of Nano Fabrication and Characterization, DTU Nanolab, Technical University of Denmark, 2800 Kgs. Lyngby, Denmark

c. Department of Health Technology, DTU Health Tech, Technical University of Denmark, 2800 Kgs. Lyngby, Denmark

d. Department of Physics, DTU Physics, Technical University of Denmark, 2800 Kgs. Lyngby, Denmark

e. Department of Pharmacy, faculty of Health and Medical Sciences, University of Copenhagen, 2100 Copenhagen, Denmark

S.1 Compression moulding concept

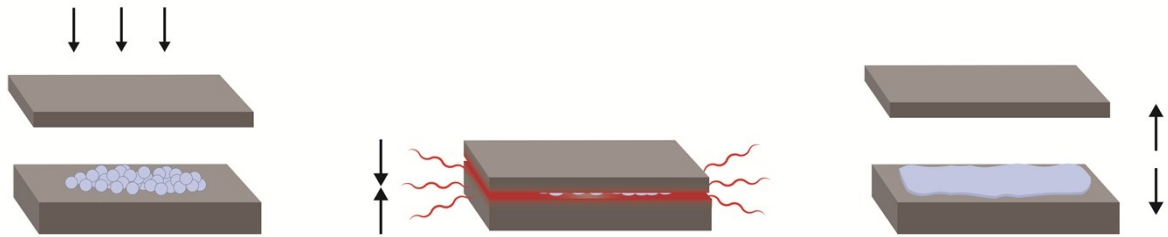


Figure 1.1: Concept of compression moulding of PCL and PVA films: A) two hot plates function as the molds for compressing PCL and PVA pellets. B) Pressure and heat is applied for a given amount of time. C) after removing the pressure and heat, a PCL device film is prepared

S2. Optical profiler measurements

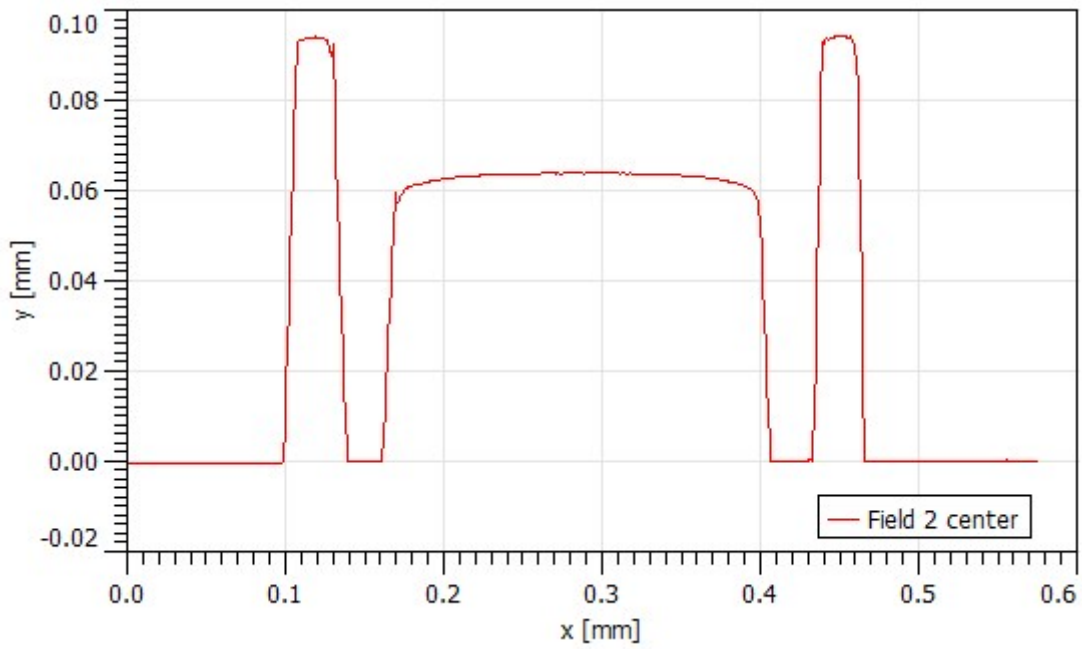


Figure 2.1: optical profile curve of a single unit for the Ni stamp

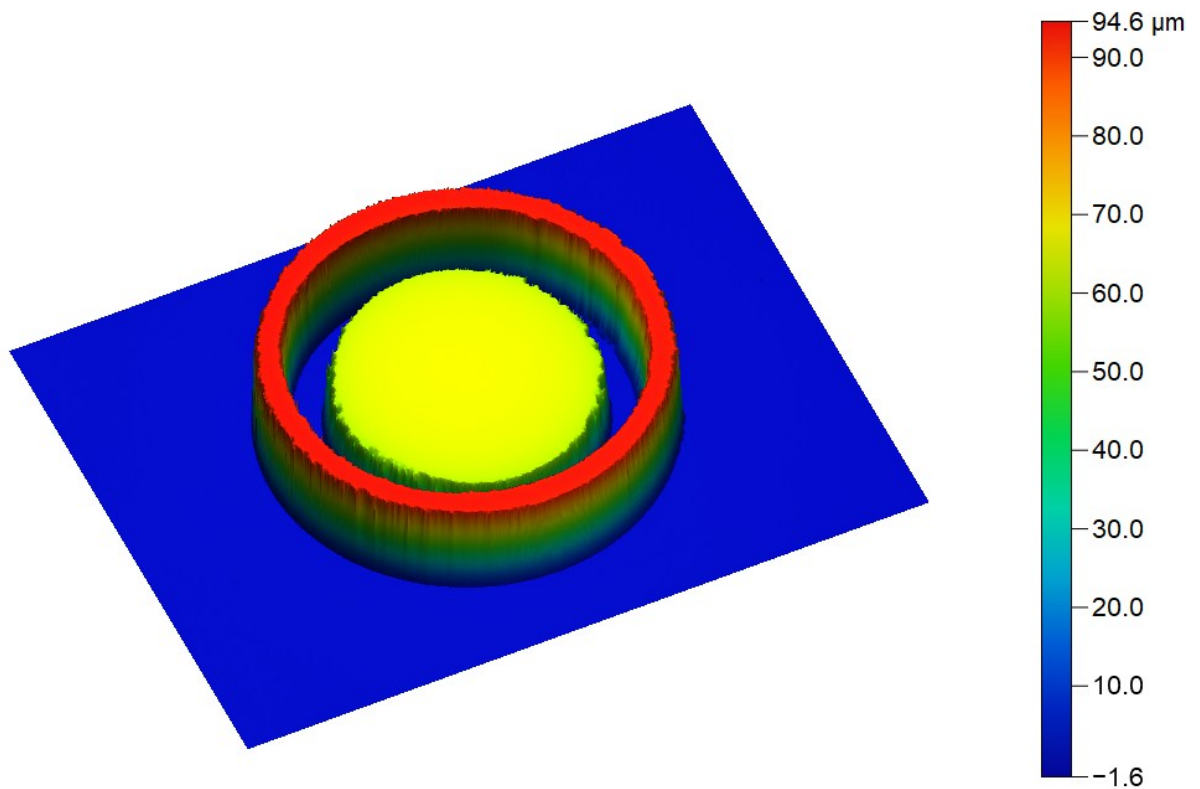


Figure 2.2: 3D rendering of one single unit for the Ni stamp

S.3 Coarse powder loading

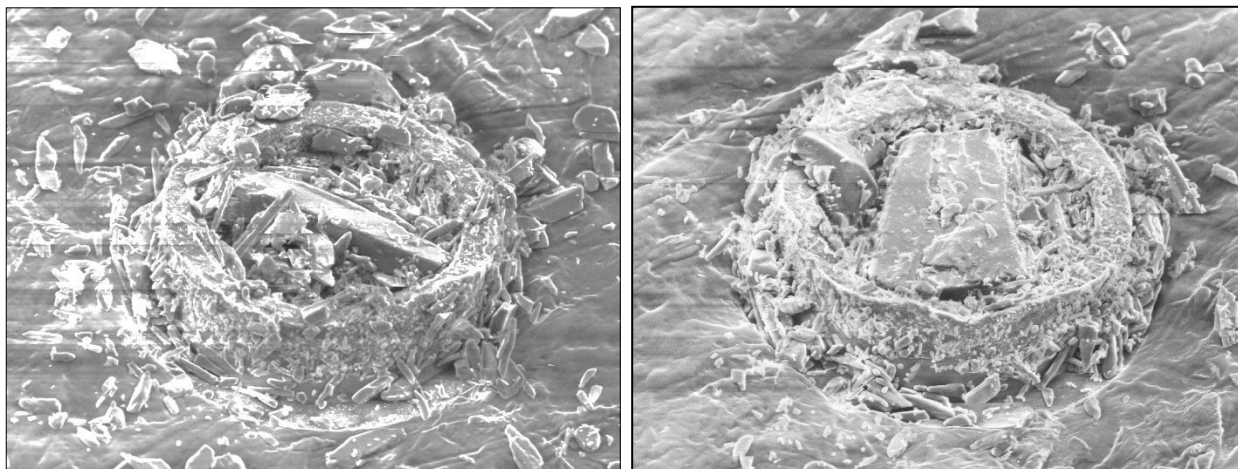


Figure 3.1: SEM images of microcontainers filled with paracetamol powder in purchased form

S.4 Microdissolution testing

Assuming a total drug release from the microcontainers, the release curve described in the paper shows that the microcontainers contain approximately 26 % of the amount that can theoretically be loaded inside microcontainers with the given volume. To find the origin of weight loss, another micro dissolution study was completed (figure 3.1) of 400 microcontainers on PVA loaded with paracetamol powder (n = 5) without the pH sensitive lid. This study showed that each microcontainer contains 2.4 μg of drug (0.97 ± 0.05 mg in total for 400 microcontainers).

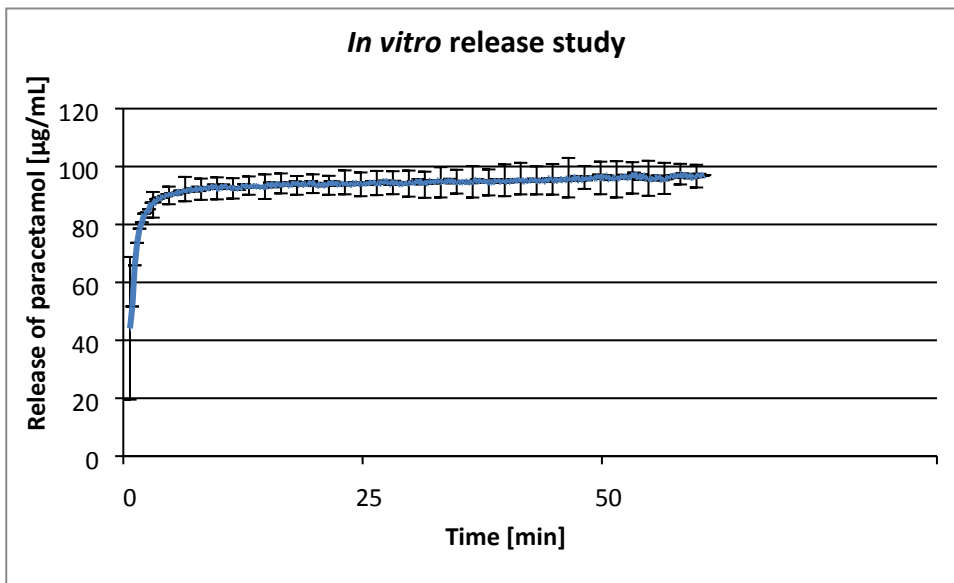


Figure 4.1: in vitro microdissolution profiles of paracetamol released from 400 uncoated microcontainers in a 10 mL FaSSIF media, measured over 60 min

S.5 X-ray microtomography images

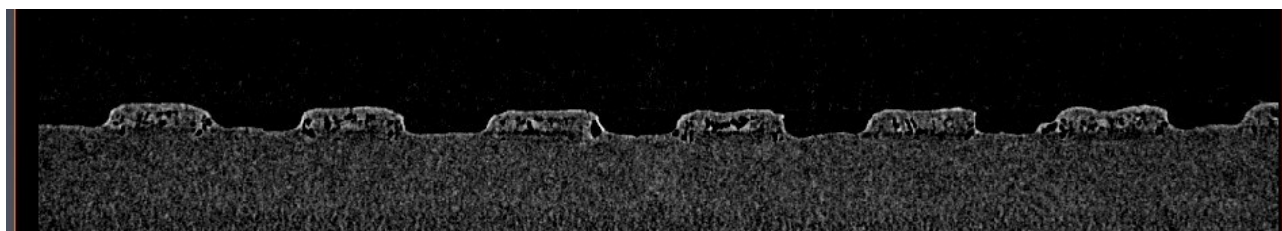


Figure5.1: Cross-section through paracetamol loaded and Eudragit®S100 coated microcontainers acquired by x-ray microtomography

S.6

Stereomicroscopy set-up with rat intestines after PK studies

