

Supplementary material

3D printed systems for specific colonic delivery of chitosan micelles for a better intestinal absorption

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Section 1: Material and methods

Table S1 – FDM settings for batches with free CTP and CPT-loaded micelles.

	Layer thickness (mm)	Perimeter speed (mm/s)	Infill speed (mm/s)	Feeding rate (mm/s)	Height (mm)	Diameter (mm)
Free CPT	0.35	8	8	1.12	7.35	12
CPT-loaded micelles	0.35	8	8	1.12	8.35	13

Table S2 – IVF settings for every printable ink injected (free drug, delaying polymer, micelles) corresponding to both batches.

		Deposit speed (μL/s)	Retract speed (μL/s)	Purge (μL)	Volume (μL)
Free CPT	Drug	7	1	0	200
	Eudaragit FS 30D	1	1	50	350
	Micelles	4	1	0	200

CPT- loaded micelles	Eudragit FS 30D	1	1	50	500
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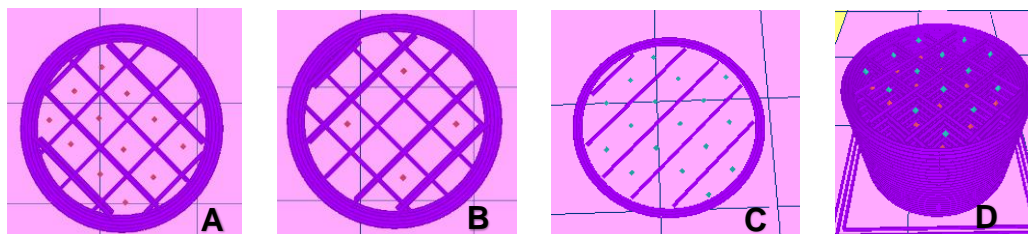


Figure S1 – Digital design of printfills: (A) injection points for micelles; (B) injection points for free drug; (C) injection points of Eudragit FS30D for both batches; and (D) general design of the printfill.

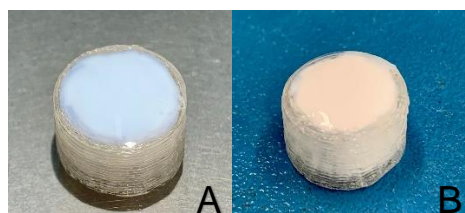


Figure S2 – Printfill before (A) and after drying step (B).

Table S3 – Details of the four phases of the intestinal transit for drug release test.

Phase	Intestinal segment	Volume (ml)*	Residence time (h)	pH
1	Stomach	500	2	1.2 ± 0.10
2	Jejunum	585	2	6.8 ± 0.20
3	Ileum (distal)	785	0.5	7.5 ± 0.25
4	Colon (proximal)	832	3.5	6.0 ± 0.25

*Approximate values

Table S4 – Switch solution compositions used in the dissolution assay.

Switch solution	Phase	Composition for one vessel
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I	1 → 2	4.08 g potassium dihydrogenphosphate, 30 mL sodium hydroxide 2.0 M (80 g/L), demineralized water of 129 mL
II	2 → 3	2.04 g potassium dihydrogenphosphate, 12.0 mL sodium hydroxide 2.0 M (80 g/L), demineralized water of 311 mL
III	3 → 4	9 mL hydrochloric acid 3.0 M, demineralized water of 60 mL

Section 2: Results and discussion

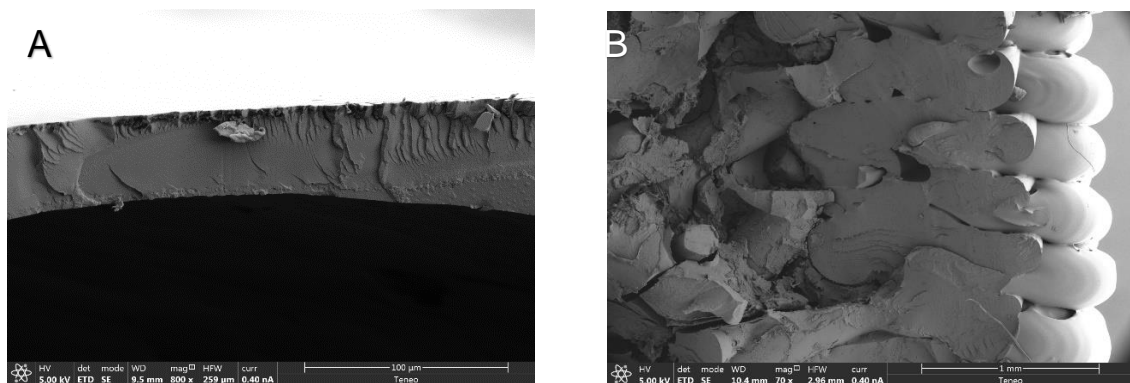


Figure S3 – SEM images of top film of Eudragit FS30D (A) and sealed PLA perimeter (B)

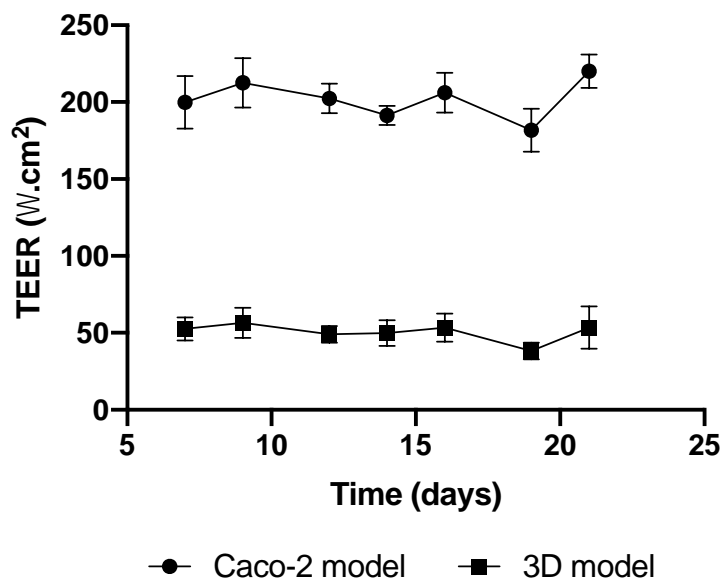


Figure S4 – TEER values of Caco-2 and 3D models during 21 days of culture. Error bars represent mean \pm SD (n = 6).