3D-Printed Drug Delivery Systems: The Effects of Drug Incorporation Methods on Their Release and Antibacterial Efficiency

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Microcomputed topography quantitative measurements

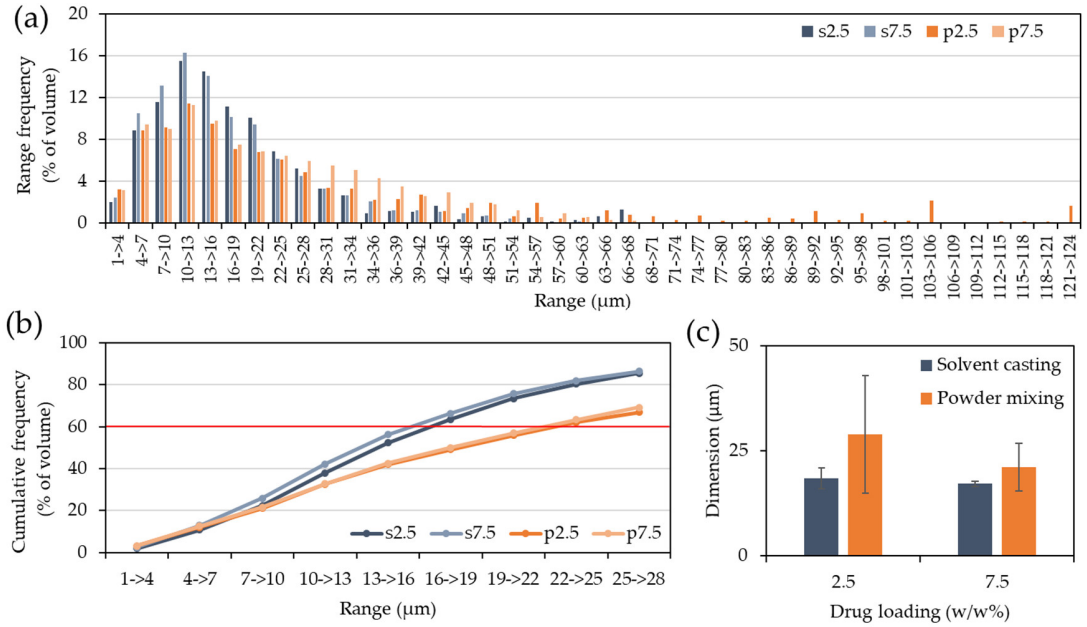

Figure S1. (**a**) Range frequency calculated as a percentage volume in a certain dimensional range, with (**b**) illustrating the cumulative frequency highlighting when percentage volume reaches around 60% of the total volume and (**c**) Particles' average dimension at different drug loading percentages.

Release kinetics models

1. First order kinetics:

$$\log\left(100 - \frac{m_t}{m_\infty}\%\right) = -\frac{K}{2.303}t \qquad \text{(S1)}$$

where m_t is the released amount at a certain time point, m_∞ is the amount of the drug released after an infinitive time, K is the first-order release rate constant and t is time [1].

2. Korsmeyer-Peppas model:

$$\log\left(\frac{m_t}{m_\infty}\%\right) = \log k_{K\text{-}P} + n \log t \qquad \text{(S2)}$$

where m_t is the released amount at a certain time point, m_∞ is the amount of the drug released after an infinitive time, k_{K-P} is the Korsmeyer-Peppas constant, n is the parameter indicative of the drug release mechanism and t is time [1]. The release model is fitted up to 60% of the release data.

3. Higuchi model:

$$Q = k_H t^{0.5} \quad \text{(S3)}$$

where Q is the percentage of the released drug, k_H is the Higuchi rate constant and t is time [1].

Table S1. Results from curve fitting the release curves to different models illustrating the value of each model parameters and the R^2 values. The model with the highest R^2 is highlighted.

Model	Formulation	Parameters	R^2
First order	s2.5	$K = 0.0016$	0.9603
	s7.5	$K = 0.0041$	0.9816
	p2.5	$K = 0.0005$	0.9084
	p7.5	$K = 0.0009$	0.9484
Korsmeyer-Peppas	s2.5	$n = 0.4235$ $k_{K-P} = 6.2302$	**0.9857**
	s7.5	$n = 0.5219$ $k_{K-P} = 5.3815$	**0.9758**
	p2.5	$n = 0.3856$ $k_{K-P} = 3.6568$	**0.9921**
	p7.5	$n = 0.3820$ $k_{K-P} = 5.2808$	**0.9876**
Higuchi model	s2.5	$k_H = 2.2190$	0.9357
	s7.5	$k_H = 2.6932$	0.8744
	p2.5	$k_H = 1.4972$	0.9766
	p7.5	$k_H = 1.9800$	0.9753

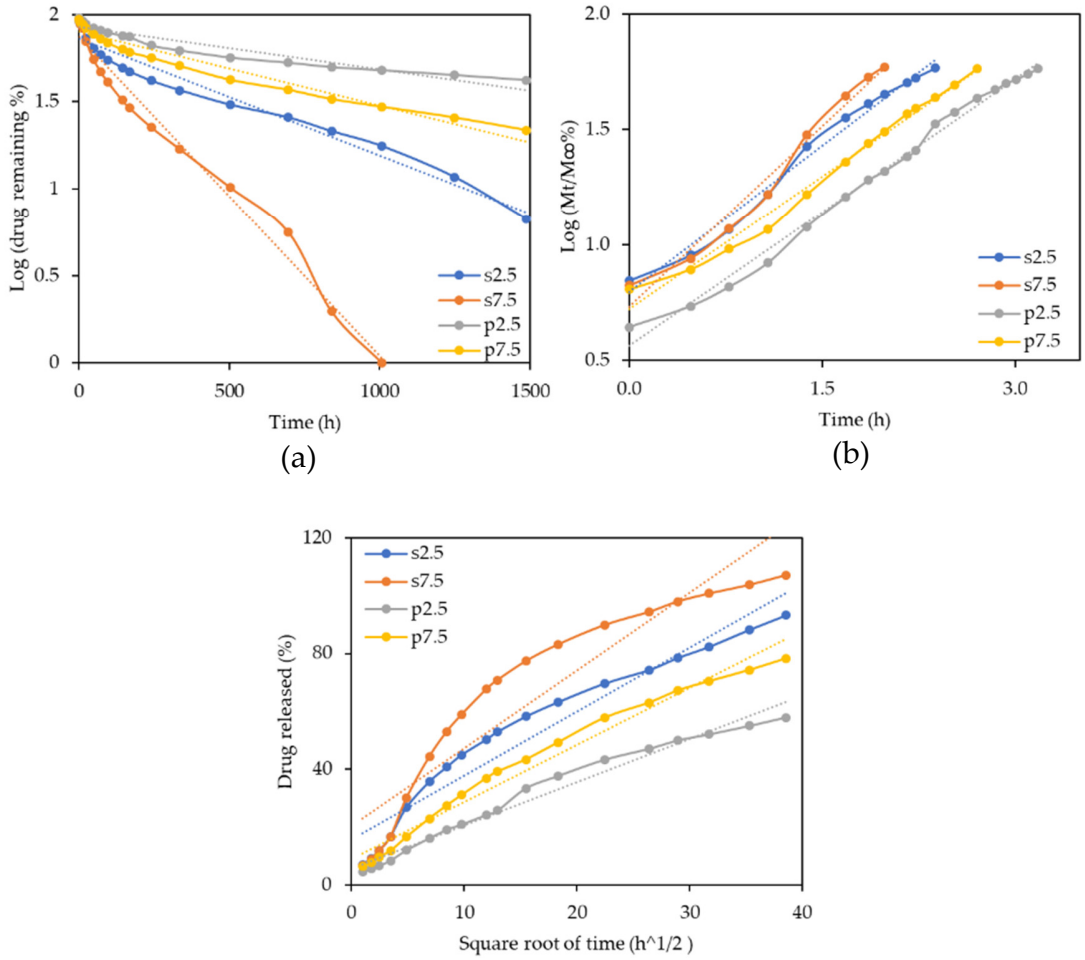

Figure S2. Release kinetics of GS from PCL samples according to (**a**) first order fitting, (**b**) fitting to Korsmeyer-Peppas model and (**c)** fitting to Higuchi model. Note: In first order modeling of s7.5 samples data points were limited to 1008 hours as the drug release reached 100%.

References

1. S., K.; Rama Pawar, R.; D. Kevadiya, B.; C. Bajaj, H. Synthesis of Saponite Based Nanocomposites to Improve the Controlled Oral Drug Release of Model Drug Quinine Hydrochloride Dihydrate. *Pharmaceuticals* **2019**, *12*, 105, doi:10.3390/ph12030105.