

Supplementary Materials: Exploring the Role of Surfactants in Enhancing Drug Release from Amorphous Solid Dispersions at Higher Drug Loadings

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Table S1. Physicochemical and thermodynamic properties of felodipine.*

Parameter	Value
Molecular weight (g/mol)	384.25
T _m (°C)	147
T _g (°C)	45
log P	3.44
Enthalpy of fusion (kJ/mol)	28.67
H-bond donors	1
H-bond acceptors	3
Rotatable bonds	6
Polar surface area (Å ²)	65

*Values are referenced from: 1. Raina, S. A.; Van Eerdenbrugh, B.; Alonzo, D. E.; Mo, H.; Zhang, G. G. Z.; Gao, Y.; Taylor, L. S. Trends in the precipitation and crystallization behavior of supersaturated aqueous solutions of poorly water-soluble drugs assessed using synchrotron radiation. *J Pharm Sci* **2015**, *104*, (6), 1981-1992.

2. Raina, S. A.; Zhang, G. G. Z.; Alonzo, D. E.; Wu, J.; Zhu, D.; Catron, N. D.; Gao, Y.; Taylor, L. S. Enhancements and limits in drug membrane transport using supersaturated solutions of poorly water soluble drugs. *J Pharm Sci* **2014**, *103*, (9), 2736-2748.

Table S2. ASD compositions studied/referenced in this work. All percent (%) compositions refer to weight%. TPGS% is on a weight percent basis out of the polymer composition. Values in red refer to polymer weight % and values in green refer to TPGS concentration (g/mL) in the dissolution medium (100 mL) assuming 100% release.

50%				45%	50
45%				49.5%	55
40%			57%	54%	60
35%			61.75%		
30%	70%	68.6%	66.5%	63%	70
25%		73.5%			
20%	80%	78.4%	76%	72%	80
15%	85%				
10%	90%	88.2%	85.5%	81%	90
5%	95%				
DL (%)	0%*	2%	5%	10%	
TPGS (%)					

*Values corresponding to 0% TPGS ASDs are referenced from, "Saboo, S.; Moseson, D. E.; Kestur, U. S.; Taylor, L. S. Patterns of drug release as a function of drug loading from amorphous solid dispersions: A comparison of five different polymers. European Journal of Pharmaceutical Sciences 2020, 155, 105514".

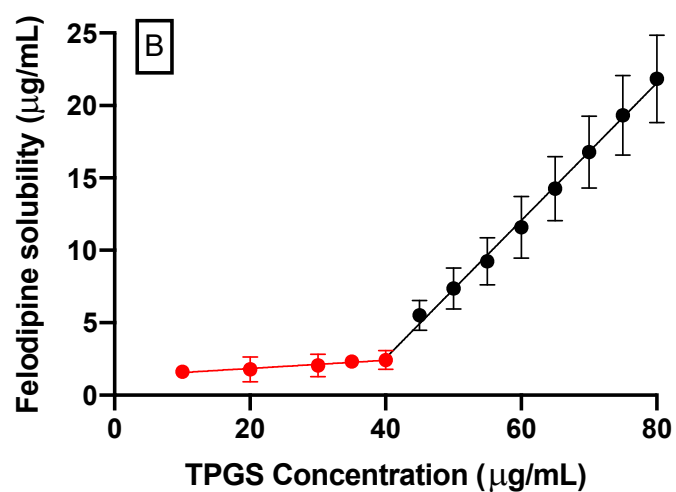
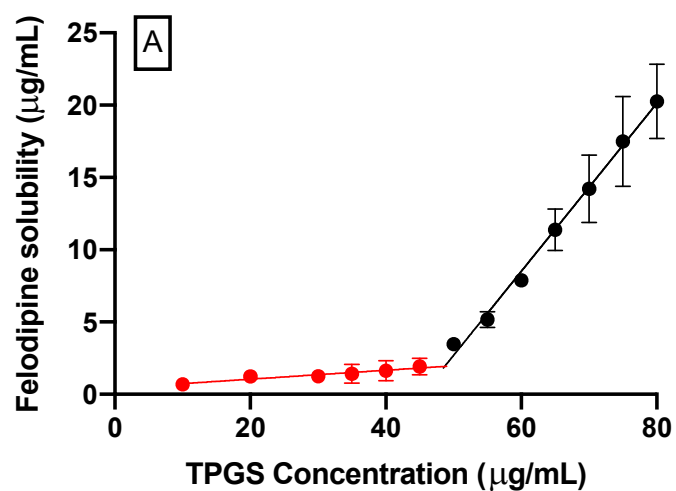


Figure S1. CMC of TPGS as determined by a change in slope of crystalline felodipine solubility in pH 6.8 buffer as a function of different concentrations of TPGS. **(A)** In the absence of PVPVA. **(B)** In the presence of 900 $\mu\text{g/mL}$ pre-dissolved PVPVA. Error bars represent standard deviations ($n = 3$).

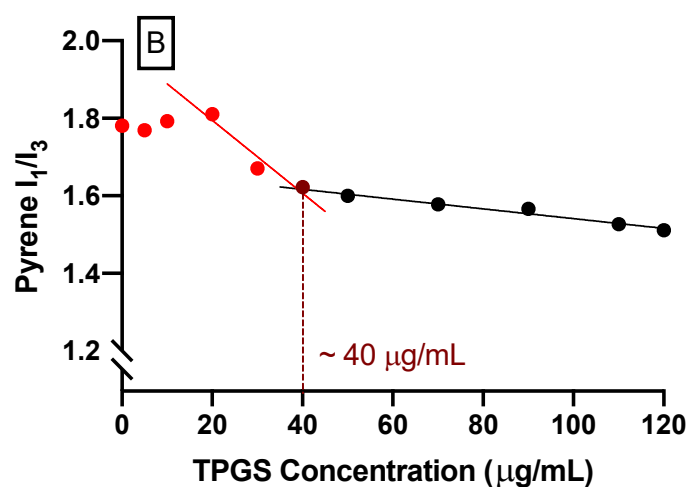
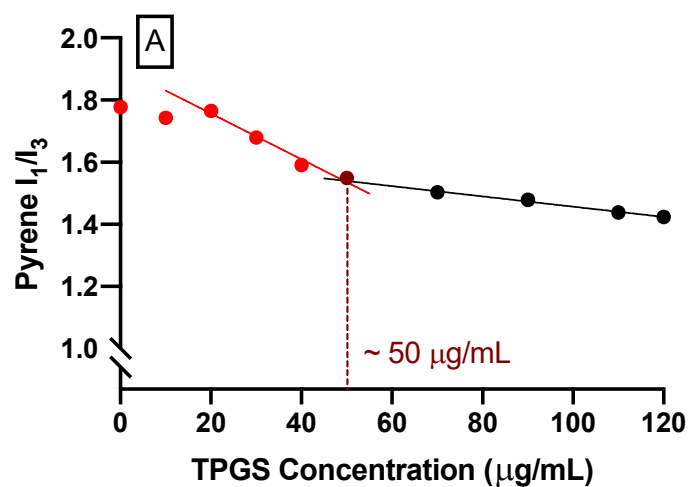


Figure S2. TPGS CMC determination in pH 6.8 phosphate buffer by the pyrene fluorescence method. CMC is determined by the change of slope. (A) In the absence of PVPVA. (B) In the presence of 900 $\mu\text{g/mL}$ pre-dissolved PVPVA.

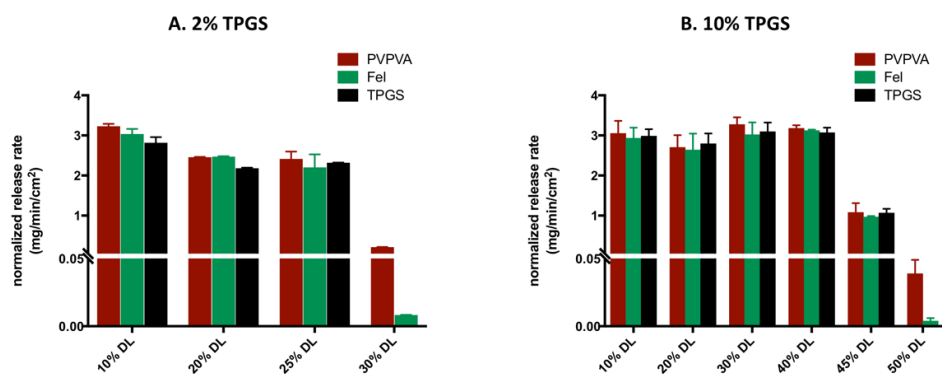


Figure S3. Surface normalized dissolution rates for amorphous felodipine, PVPVA, and TPGS for different drug loading ASDs with 2% TPGS (A) and 10% TPGS (B). Error bars represent standard deviations, $n = 3$.

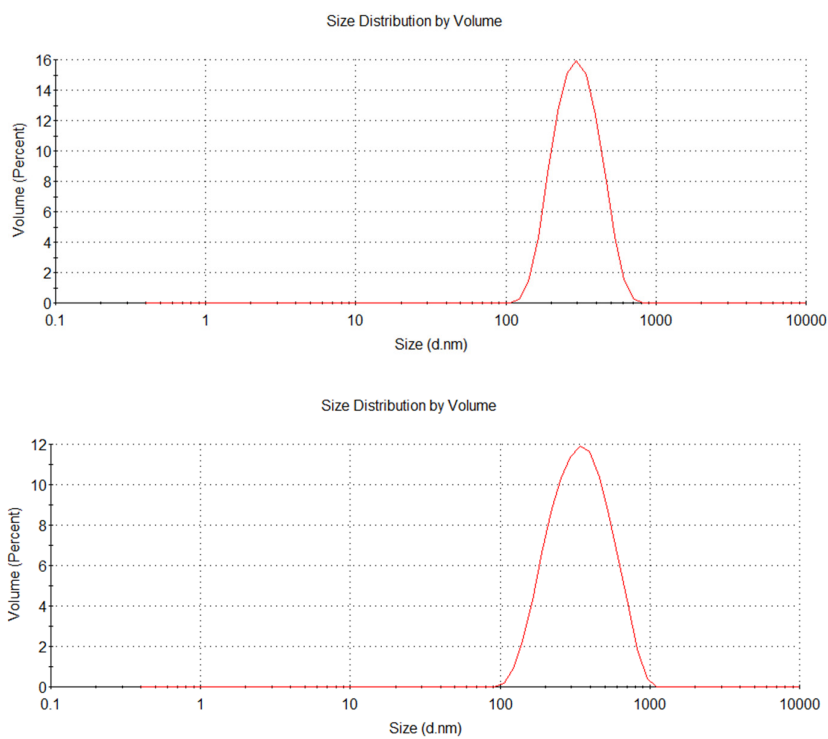


Figure S4. Representative DLS data showing size distribution for amorphous nanoparticles generated upon dissolution: without TPGS (top) and with TPGS (5%) (bottom) at 10% DL.

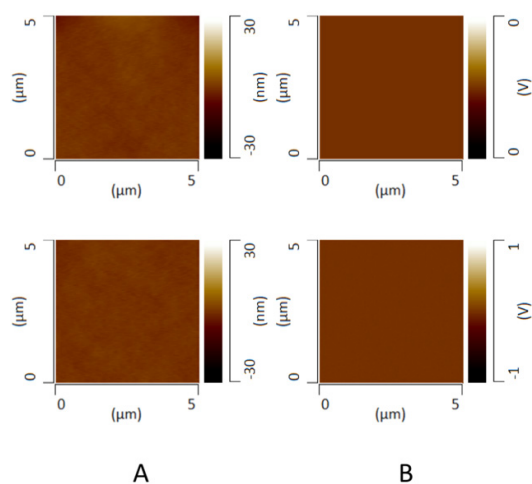


Figure S5. Representative AFM topographical (A) and deflection images (B) of the freshly prepared films of binary felodipine-PVPVA ASD (top) and ternary felodipine-PVPVA ASD at 10% TPGS level (bottom).