Supporting Information

for
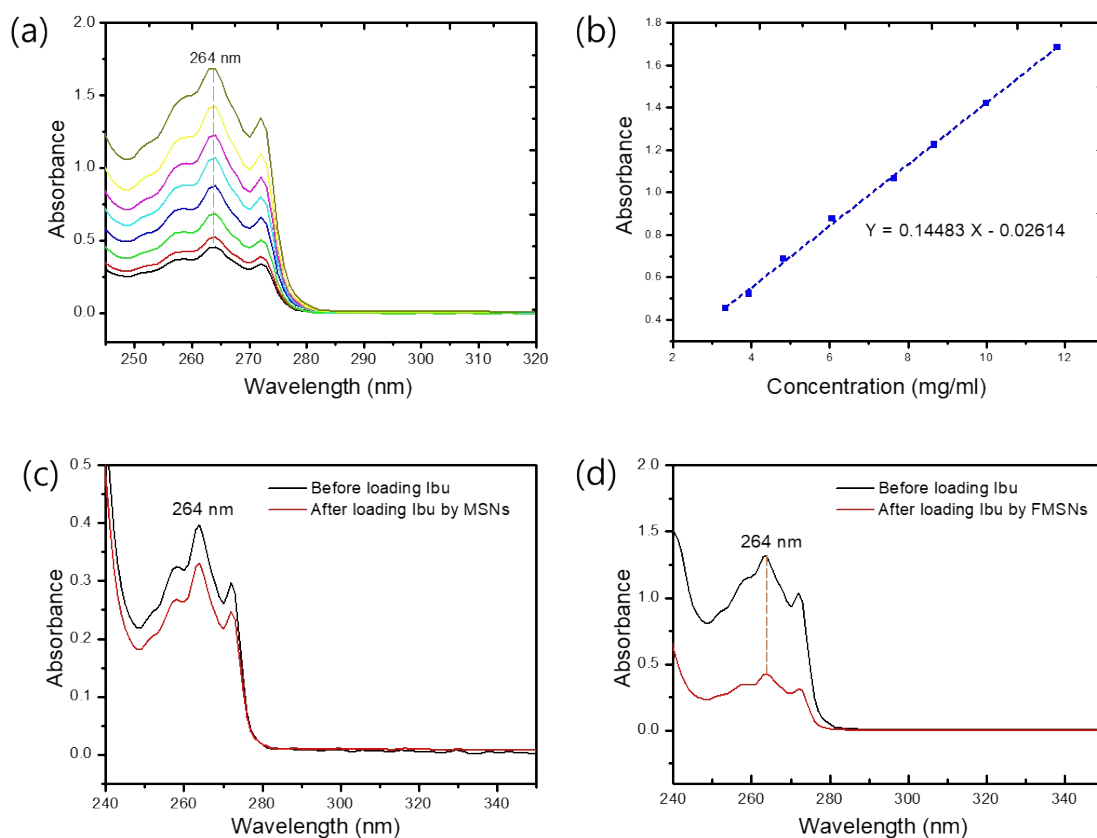
Comparative release kinetics of small drugs (ibuprofen and acetaminophen) from multifunctional mesoporous silica nanoparticles

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Fig. S1. (a) The UV-VIS spectrum of Ibuprofen in ethanol, (b) the linear part of the standard curve of ibuprofen absorption at 264nm in ethanol over concentration ranges (3-12 mg/mL), (c) UV-Vis absorption spectra of the solution before and after loading ibuprofen by MSNs, (d) UV-Vis absorption spectra of the solution before and after loading ibuprofen by FMSNs.
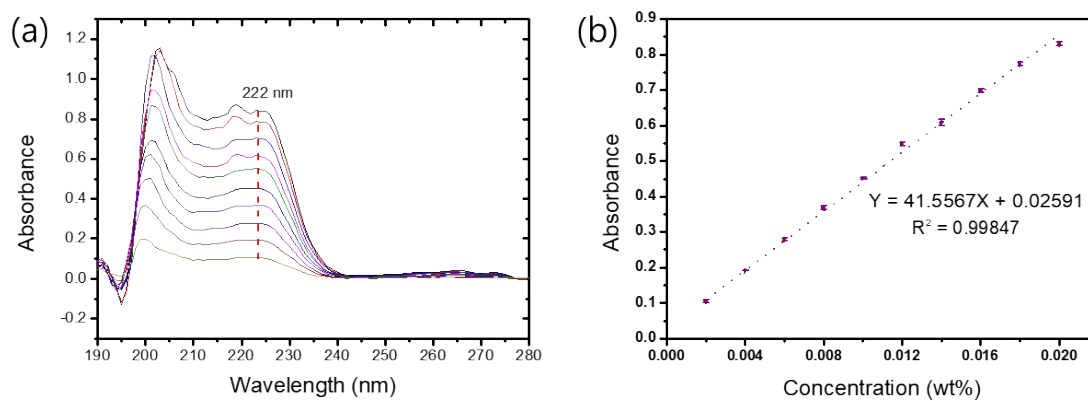
Fig. S2. (a) The UV-VIS spectrum of Ibuprofen in PBS, (b) Linear part of the standard curve of ibuprofen absorption at 222 nm in PBS: concentration ranges from 0.002 to 0.02 wt%.
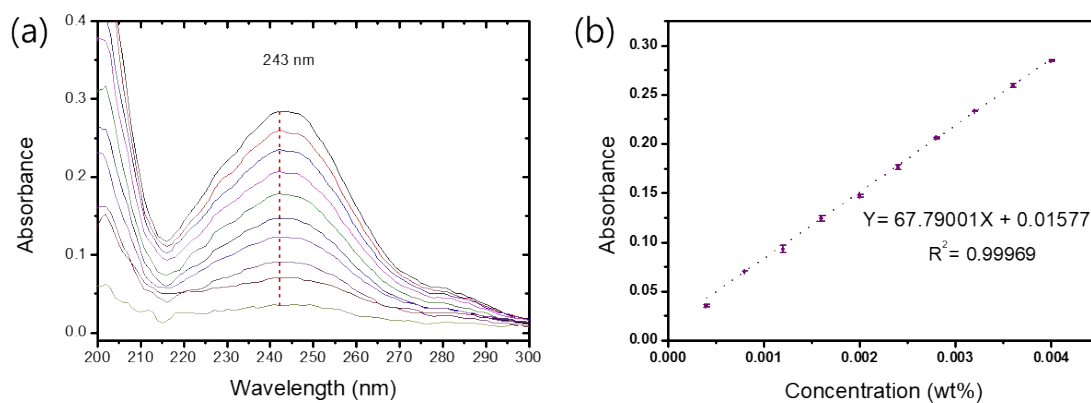
Fig. S3. (a) The UV-VIS spectrum of Acetaminophen in PBS, (b) Linear part of the standard curve of acetaminophen absorption at 243 nm in PBS: concentration ranges from 0.0004 to 0.004 wt%.
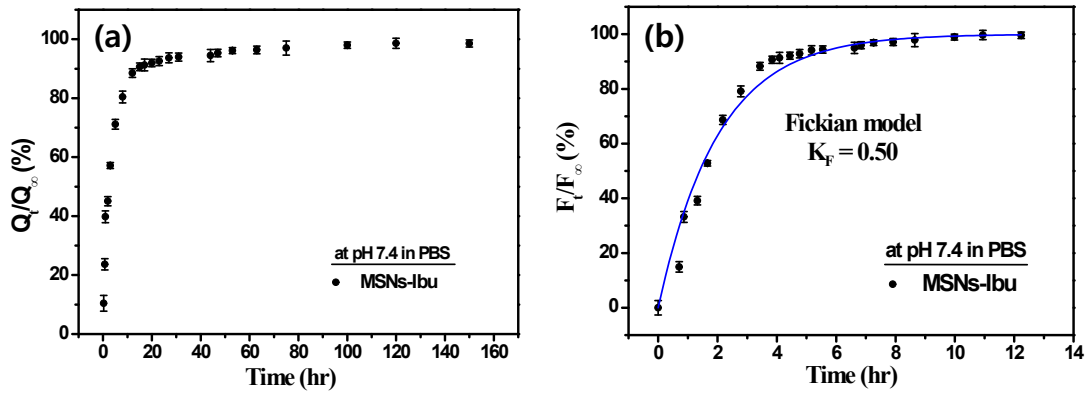
**Fig. S4.** Absorbance profiles of released Ibuprofen from MSNs in PBS at 37 °C; (a) the correlation between cumulative release fraction and release times; (c) the model fits of release kinetics of MSNs-Ibu by the exponential Fickian model.
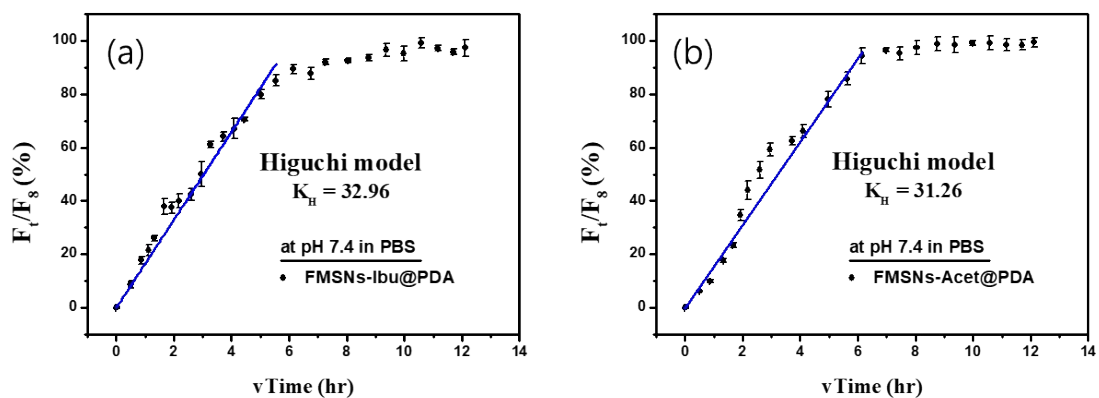
Fig. S5. The Model fits of (a) Ibuprofen and (b) Acetaminophen release from FMSNs-Drug@PDA in PBS at 37 °C by the Higuchi model versus cumulative time or square root time.
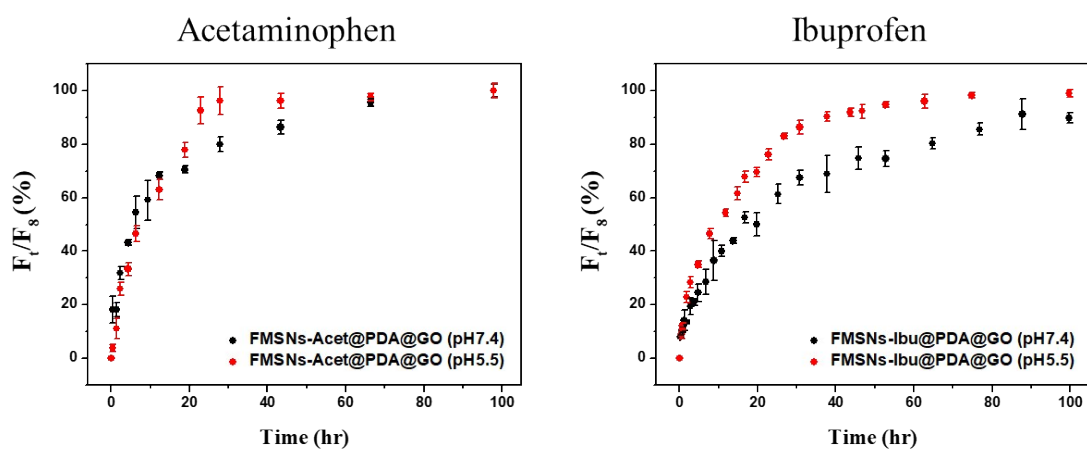
Fig S6. The comparative release rate of acetaminophen and ibuprofen of FMSNs-drug@PDA@GO at different pHs.

Table S1. Physicochemical properties of as-prepared samples measured by BET-BJT, DLS and SEM instruments.

Particle type	BET- BJH method			SEM Particle size (nm)	DLS Particle size (nm)
	surface area[1] (m^2/g)	Pore volume[2] (cm^3/g)	Pore size[2] (nm)		
MSNs	209	0.46	8.7	125 ± 5	124 ± 10
FMSNs	3391	4.00	4.7	123 ± 3	123 ± 2
FMSNs@PDA	-	-	-	127 ± 5	126 ± 14
FMSNs@PDA@GO	-	-	-	129 ± 2	129 ± 9

1) The surface area was estimated according to the BET method.
2) The pore size and pore volume were estimated by the BJH analysis.

Table S2. The summary of fitted parameter values of kinetic models applied to the release data of MSNs-Drug@A-F, MSNs-Drug@A-F@PDA, MSNs-Drug@A-F@PDA@GO (**A**: Fick's law, **B**: Higuchi model, **C**: K-P model)

Case	As-prepared MSNs	Diffusion models	Formula	Parameters
A	FMSNs-Ibu	Fick's law	$F_t/F_\infty = 1-e^{-k_F t}$	$k_F = 0.38$
	FMSNs-Acet	Fick's law	$F_t/F_\infty = 1-e^{-k_F t}$	$k_F = 0.62$
B	FMSNs-Ibu@PDA@GO (pH7.4)	Higuchi model	$F_t/F_\infty = k_H t^{1/2}$	$k_{H1} = 23.62$ $k_{H2} = 8.87$
	FMSNs-Ibu@PDA@GO (pH5.5)	Higuchi model	$F_t/F_\infty = k_H t^{1/2}$	$k_H = 32.04$
	FMSNs-Acet@PDA@GO	Higuchi model	$F_t/F_\infty = k_H t^{1/2}$	$k_H = 25.40$
	FMSNs-Ibu@PDA	Higuchi model	$F_t/F_\infty = k_H t^{1/2}$	$k_H = 32.96$
	FMSNs-Acet@PDA	Higuchi model	$F_t/F_\infty = k_H t^{1/2}$	$k_H = 31.26$
C	FMSNs-Ibu@PDA	K-P model	$F_t/F_\infty = k_R t^n$	$k_R = 19.61$, $n = 0.47$
	FMSNs-Acet@PDA	K-P model	$F_t/F_\infty = k_R t^n$	$k_R = 15.00$, $n = 0.62$

* K-P model indicate the Korsmeyer-Peppas model.

** Ibu indicates Ibuprofen.

***Acet indicates Acetaminophen.