Electronic Supplementary Material (ESI) for Food & Function.

SUPPORTING INFORMATION

Design of Polymer-free Vitamin-A acetate/Cyclodextrin Nanofibrous Webs: Antioxidant and Fast-dissolving Property

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Table S1. The solution properties of viscosity and conductivity and the fiber diameters of resulting electrospun nanofibers.

Nanofibers	Molar ratio (Vitamin-A acetate:CD)	Viscosity (Pa·s)	Conductivity (μS/cm)	Average diameter (nm)
HPβCD	-	1.533	36.3	220±60
Vitamin-A acetate/ HPβCD	1:2	1.904	34.7	195±85
HPγCD	-	2.567	5.8	1260±245
Vitamin-A acetate/ HPγCD	1:2	3.637	6.8	610±275

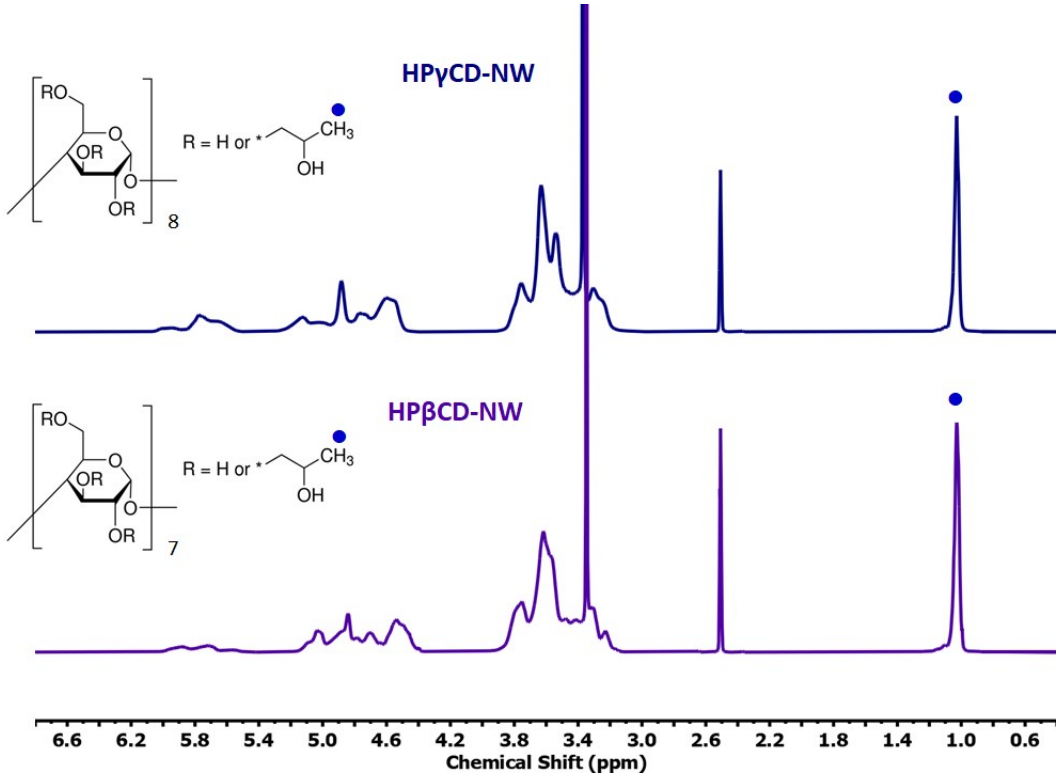

Fig. S1 ^{1}H-NMR spectra of HPβCD-NW and HPγCD-NW which were recorded by dissolving samples in *d6*-DMSO.

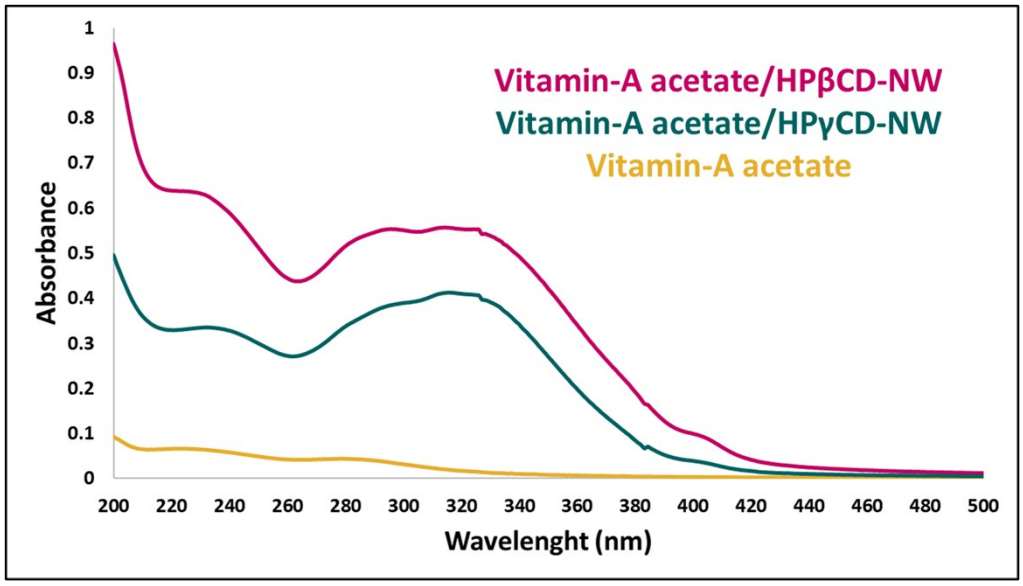

Fig. S2. UV-Vis spectroscopy graphs of the solutions of Vitamin-A acetate powder, Vitamin-A acetate/HPβCD-NW and Vitamin-A acetate/HPγCD-NW.

Note: For spectrophotometric measurements, ~ 1 mg of Vitamin-A acetate powder and ~ 10 mg of Vitamin-A acetate/CD-NW were stirred in 5 mL distilled water for 1 hour at RT and 150 rpm. Afterwards, all systems were filtered by PTFE filter (0.45 μm) to remove the un-dissolved Vitamin-A acetate parts and UV-Vis measurements were conducted in the range of 200–500 nm.

Application of release data on mathematical models:

Zero order model: The release of drug can be represented by the equation:

C_0-C_t =K_0t

C_t=C_0+K_0t

C_t is the amount of drug released at time t, C_0 is the initial concentration of drug at time t=0, K_0 is the zero-order rate constant. Here, the slope of the cumulative drug release *vs.* time plot gives the correlation coefficient (R^2) value.

First order model: The release of drug can be represented by the equation:

DC/dt=-K_1C

K_1 is the first order rate constant, expressed in time^{-1} or per hour

After rearranging and integrating the equation,

Log C=log C_0-K_1t/2.303

C_0 is the initial concentration of the drug, C is the percent of drug remaining at time t. Here, the slope of the log % of drug remaining *vs.* time gives the R^2 value.

Higuchi model: Higuchi release model is represented as:

$M_t/M_\infty = K_h t^{1/2}$

where M_t/M_∞ is the fraction of drug released at each time point (t), Mt is the amount of drug released in time t, M∞ is the amount of drug released after time ∞, and K_h represents the Higuchi release kinetic constant. Here, the plot is obtained by cumulative percentage drug release *vs.* square root of time and the slope gives R^2 value.

Korsmeyer-peppas model: Korsmeyer-peppas model is represented as:

$M_t/M_\infty=K_{kp}t^n$

Log (M_t/M_∞) =log K_{kp} + nlog t

M_t/M_∞ is a fraction of drug released at time t, M_t is the amount of drug released in time t, M_∞ is the amount of drug released after time ∞, n is the diffusional exponent or drug release exponent, K_{kp} is the Korsmeyer release rate constant. Here, the graph is plotted between log cumulative % drug release *vs.* log time and the slope gives R^2 value.

Table S2. The correlation coefficient (R^2) values of Vitamin-A acetate powder, Vitamin-A acetate/HPβCD-NW and Vitamin-A acetate/HPγCD-NW calculated by using different kinetic models.

kinetic model	**Vitamin-A acetate powder**	**Vitamin-A acetate/HPβCD-NW**	**Vitamin-A acetate/HPγCD-NW**
Zero-order	0.3349	0.1779	0.2479
First-order	0.3350	0.1514	0.2888
Higuchi	0.5699	0.3836	0.4641
Korsmeyer-Peppas	0.6768	0.7565	0.7722
Diffusion exponent (*n* value) *	-0.3371	0.6651	0.5980

*calculated by the linear regression of Korsmeyer-Peppas equation of $\log(M_t/M_\infty)$ versus log *t*.