

**Supplementary Table S1: Molecular weight and hydrodynamic radius of Xanthan, Alginate and IDeg**

	Molecular Weight (kDa)	Hydrodynamic radius* <sup>2</sup> at 20°	Hydrodynamic radius* <sup>2</sup> at 37°
Xanthan	261	79	75
Alginate	56	15	15
IDeg	73* <sup>1</sup>	5	4.4

\*<sup>1</sup>- Molecular weight of a dodecamer of insulin

\*<sup>2</sup> -Calculated using  $R_h = \left(\frac{3[\eta]M}{10\pi N}\right)^{1/3}$

Armstrong, J.K., et al., *The hydrodynamic radii of macromolecules and their effect on red blood cell aggregation*. Biophysical journal, 2004. **87**(6): p. 4259-4270.

**Supplementary Table S2: Intrinsic viscosity (ml/g) of insulin degludec (IDeg), xanthan (X), alginate (A), Binary system containing xanthan and alginate (XA) and PIC measured at 20°C and 37°C**

	Intrinsic viscosity at 20°C	R <sup>2</sup>	Intrinsic viscosity at 37°C	R <sup>2</sup>	P value
<b>X</b>	12000 ± 520	0.987	10300 ± 6000	0.968	0.55
<b>A</b>	360 ± 31	0.996	360±11	0.999	0.41
<b>IDeg</b>	9.2 ± 1.4	0.950	7.4 ± 1.8	0.947	0.022
<b>XA</b>	1000 ± 160	0.976	590 ± 60	0.996	3.8x10 <sup>-13</sup>
<b>PIC</b>	490 ± 60	0.998	710 ± 58	0.998	1.2x10 <sup>-13</sup>

**Supplementary Table S3:** Results for ANOVA test for PSD of Xanthan (X), alginate (A), Insulin degludec (IDeg), XA, and PIC at a range of temperatures (4, 18 and 37°C) on Day 1, Day 7, and Day 14

	Day 1		Day 7		Day 14	
<b>X</b>	F <sub>1,2</sub> =33.50	P=0.11	F <sub>1,2</sub> =35.49	P=0.11	F <sub>1,2</sub> =301.42	P=0.04
<b>A</b>	F <sub>1,2</sub> =28.42	P=0.12	F <sub>1,2</sub> =60.45	P=0.08	F <sub>1,2</sub> =14.31	P=0.16
<b>IDeg</b>	F <sub>1,2</sub> =375.01	P=0.03	F <sub>1,2</sub> =25.17	P=0.13	F <sub>1,2</sub> =1.16	P=0.48
<b>XA</b>	F <sub>1,2</sub> = 2.44	P=0.36	F <sub>1,2</sub> =4382.43	P=0.01	F <sub>1,2</sub> =4.52	P=0.28
<b>PIC</b>	F <sub>1,2</sub> =1.07	P=0.49	F <sub>1,2</sub> =3395.93	P=0.01	F <sub>1,2</sub> =0.30	P=0.68

**Supplementary Table S4:** MANOVA analysis

Component	F statistic	Significance
<b>Sample</b>	F <sub>4,1765</sub> =6543	P<0.001
<b>Concentration</b>	F <sub>10,1765</sub> =487	P<0.001
<b>Temperature</b>	F <sub>7,1765</sub> =1181	P<0.001
<b>Sample*Concentration</b>	F <sub>39,1765</sub> =354	P<0.001
<b>Sample*Temperature</b>	F <sub>28,1765</sub> =51	P<0.001
<b>Temperature*Concentration</b>	F <sub>70,1765</sub> =13	P<0.001
<b>Sample*Temperature*Concentration</b>	F <sub>273,1765</sub> =4	P<0.001