

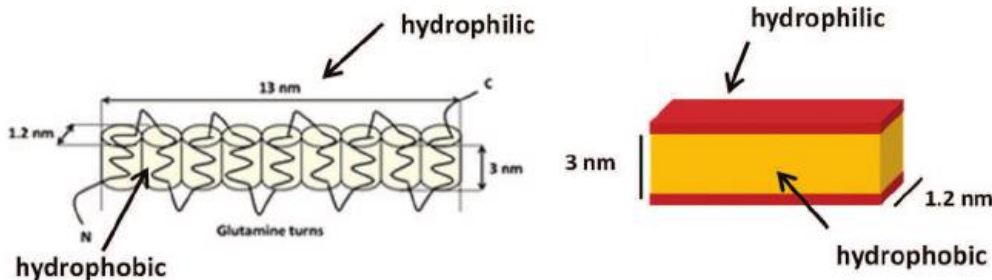
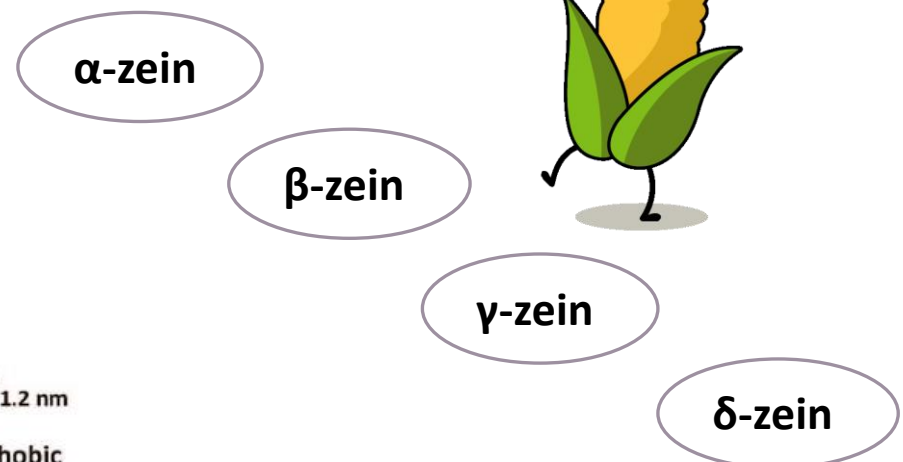
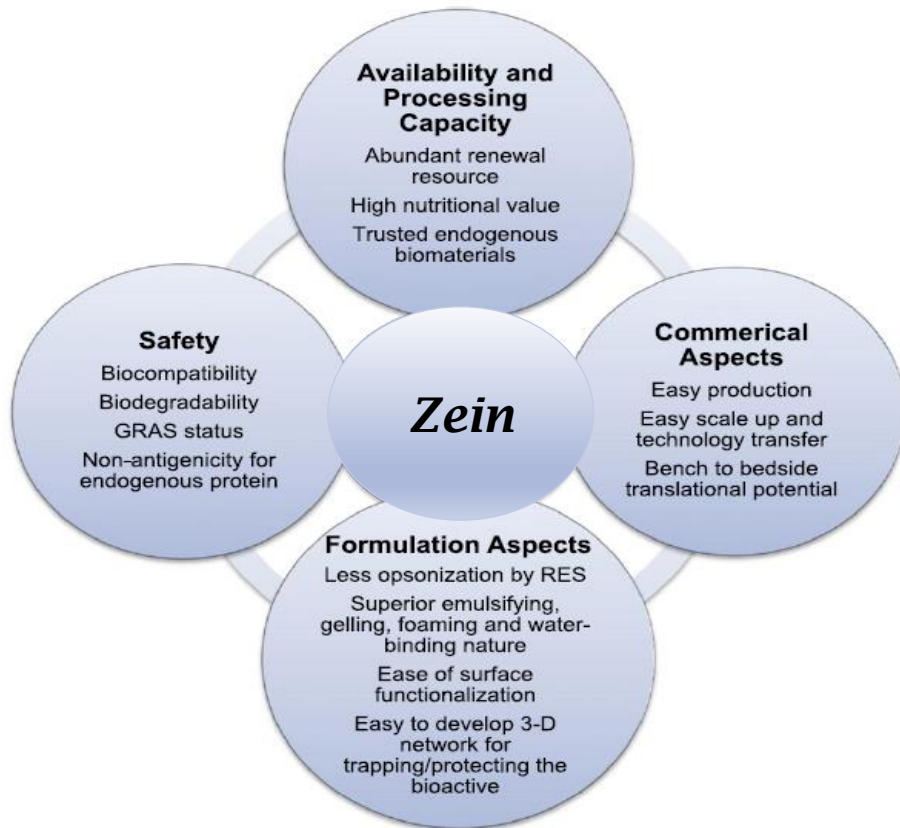
Zein nanoparticles as versatile carriers for the delivery of bioactive compounds

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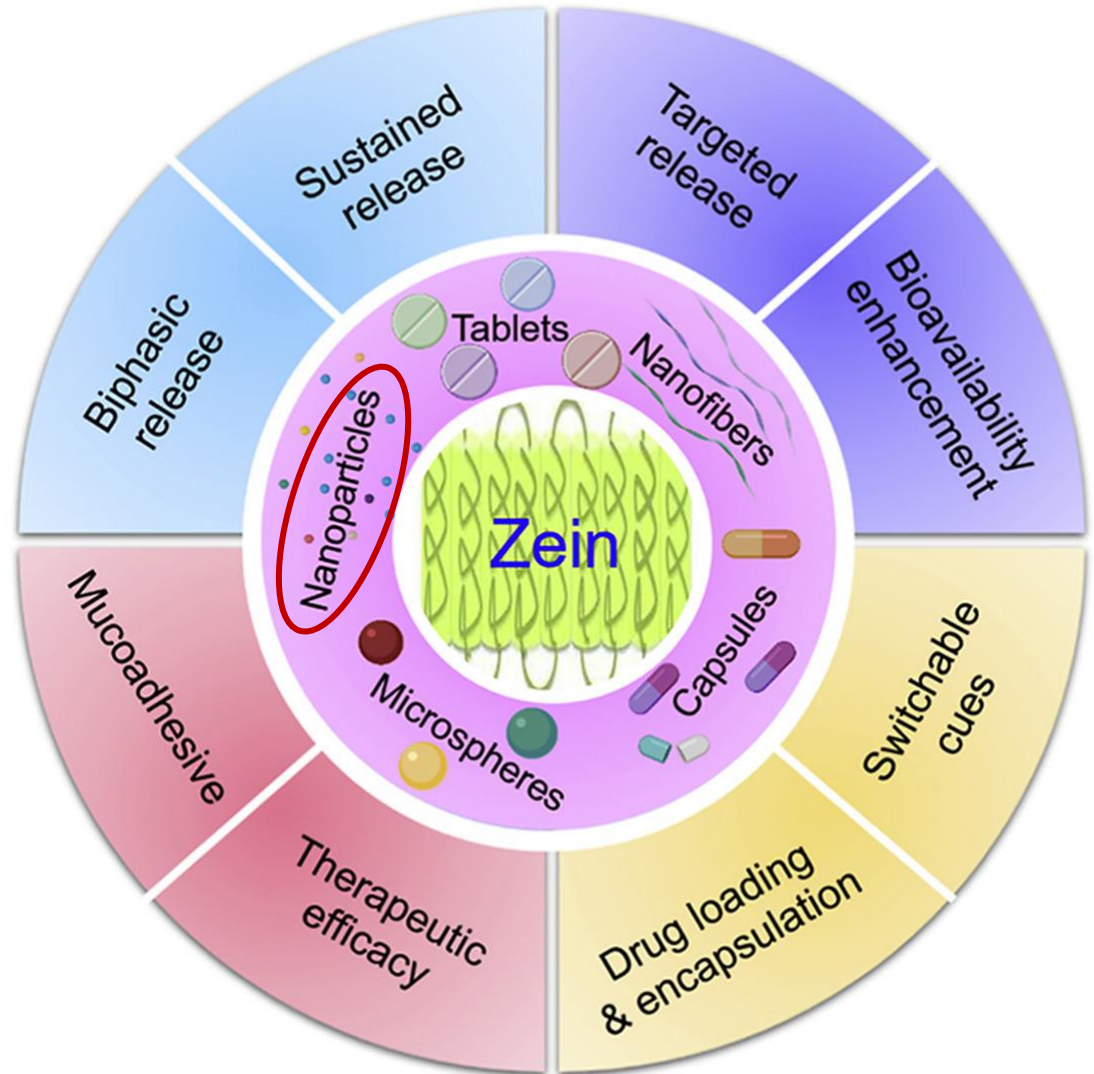




Yellow zein



White zein



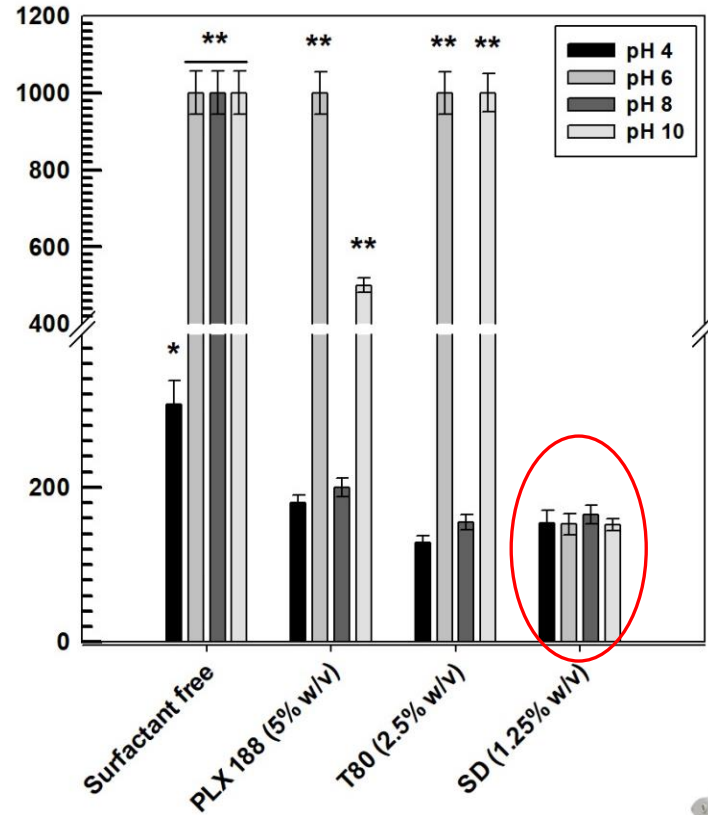
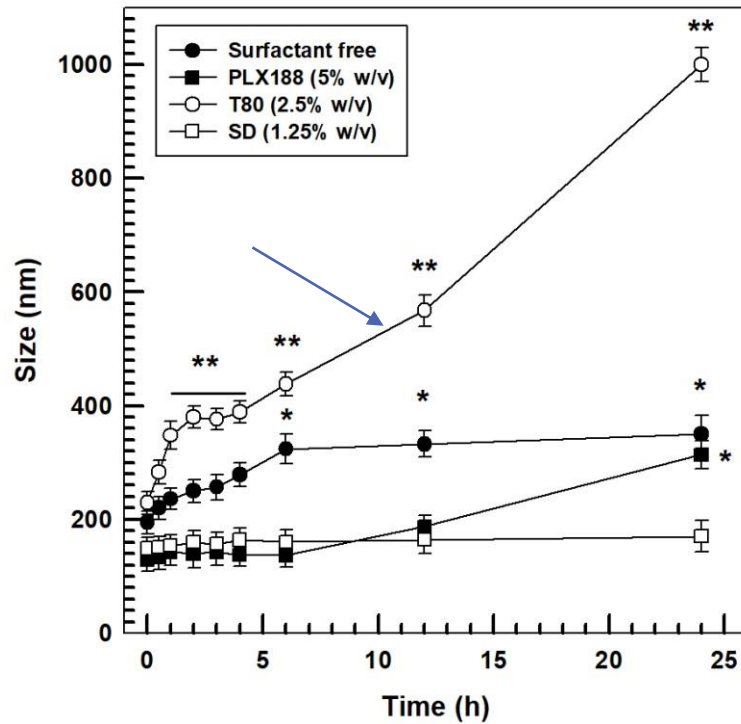
Adapted from Raza et al., 2020

Physico-chemical characterization of zein-based nanosystems

Physico-chemical characterization of zein-based nanosystems.

Sample	Zein (mg/ml)	T80 (% w/v) ^a	PLX188 (% w/v) ^b	SD (% w/v) ^c	Mean sizes (nm)	Polydispersity index	Zeta potential (mV)
A	0.2	-	-	-	401 ± 16	0.28 ± 0.14	-14 ± 1
B	0.4	-	-	-	312 ± 9	0.25 ± 0.01	-3 ± 1
C	0.6	-	-	-	140 ± 1	0.23 ± 0.01	6 ± 1
D	0.8	-	-	-	131 ± 1	0.21 ± 0.01	7 ± 2
E	1	-	-	-	120 ± 1	0.22 ± 0.01	12 ± 1
F	2	-	-	-	106 ± 1	0.20 ± 0.01	20 ± 1
G	3	-	-	-	115 ± 1	0.42 ± 0.01	30 ± 1
H	4	-	-	-	141 ± 3	0.53 ± 0.02	30 ± 1
I	2	1.25	-	-	274 ± 19	0.51 ± 0.09	9.3 ± 2
L	2	2.5	-	-	127 ± 1	0.17 ± 0.01	12 ± 1
M	2	5	-	-	137 ± 1	0.23 ± 0.01	10 ± 2
N	2	-	1.25	-	106 ± 1	0.21 ± 0.03	20 ± 1
O	2	-	2.5	-	103 ± 1	0.18 ± 0.01	33 ± 5
P	2	-	5	-	93 ± 1	0.12 ± 0.01	21 ± 3
Q	2	-	-	1.25	110 ± 1	0.11 ± 0.01	-34 ± 3
R	2	-	-	2.5	306 ± 15	0.45 ± 0.06	-42 ± 1
S	2	-	-	5	>1000	0.72 ± 0.15	-37 ± 5

Physico-chemical characterization





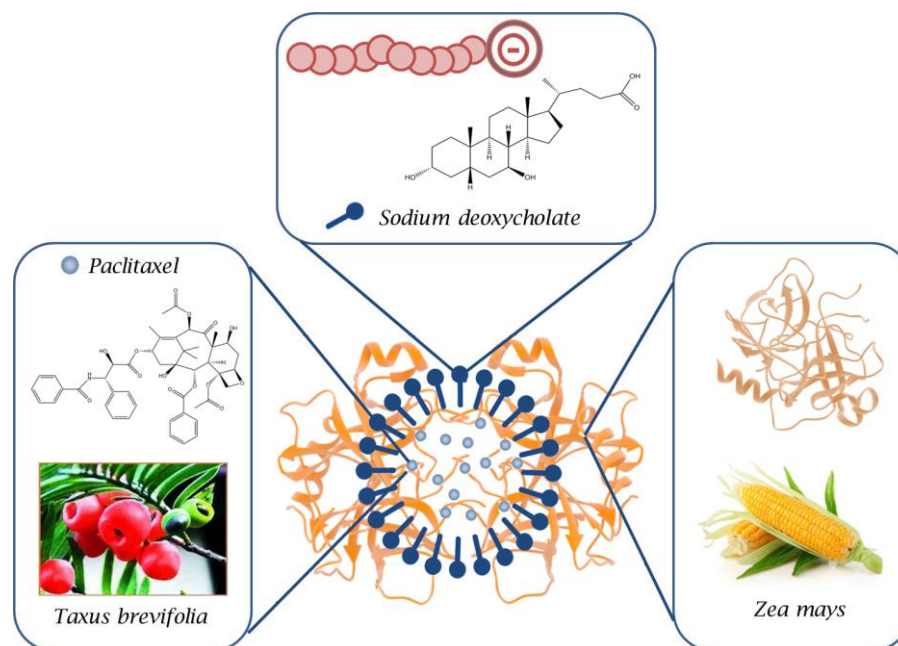
Paclitaxel-loaded sodium deoxycholate-stabilized zein nanoparticles: characterization and *in vitro* cytotoxicity

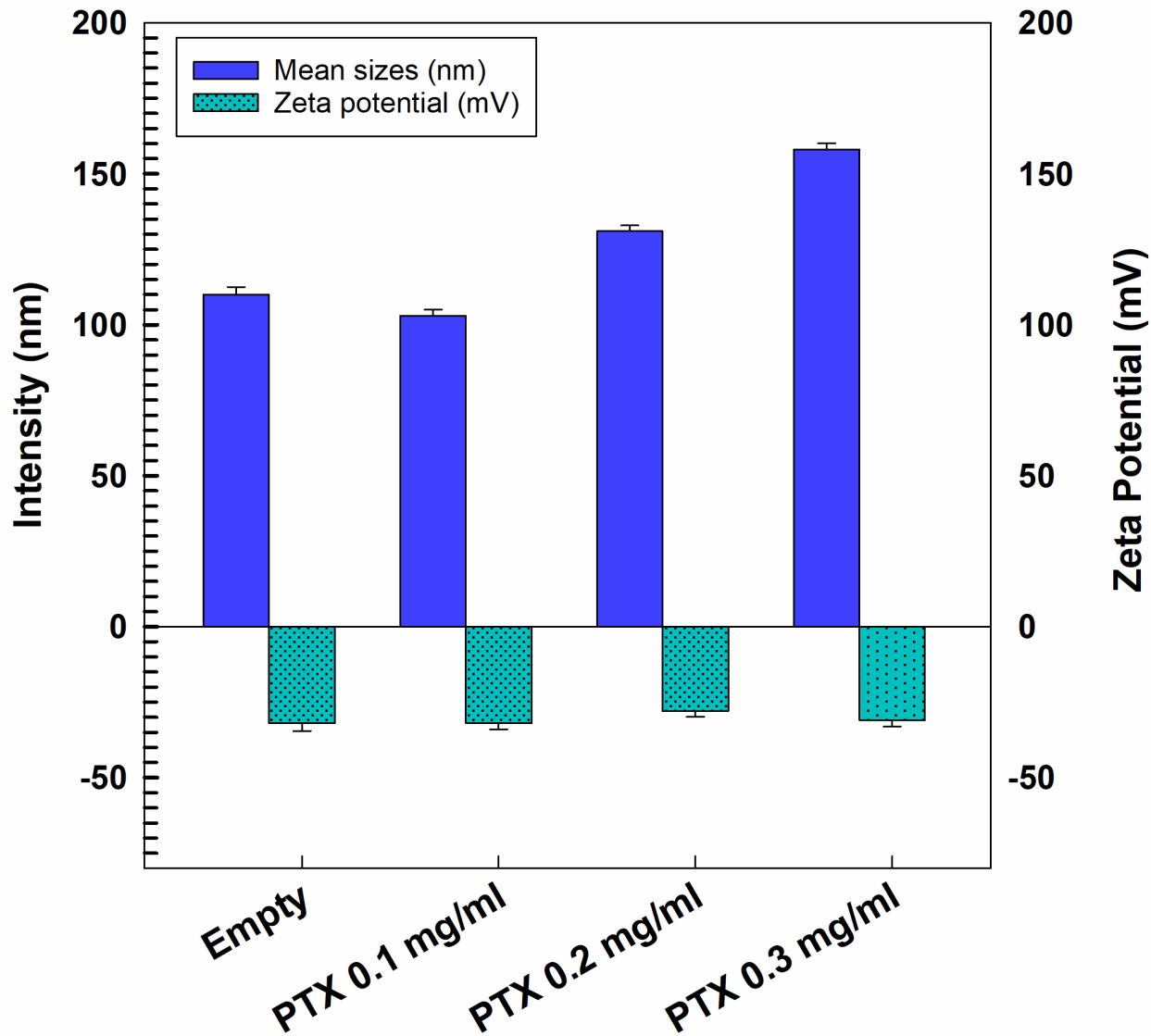
Agnese Gagliardi^a, Sonia Bonacci^b, Donatella Paolino^a, Christian Celia^c, Antonio Procopio^b, Massimo Fresta^{b,*}, Donato Cosco^{b,*}

^a Department of Experimental and Clinical Medicine, University "Magna Graecia" of Catanzaro, Campus Universitario "S. Venuta", I-88100, Catanzaro, Italy

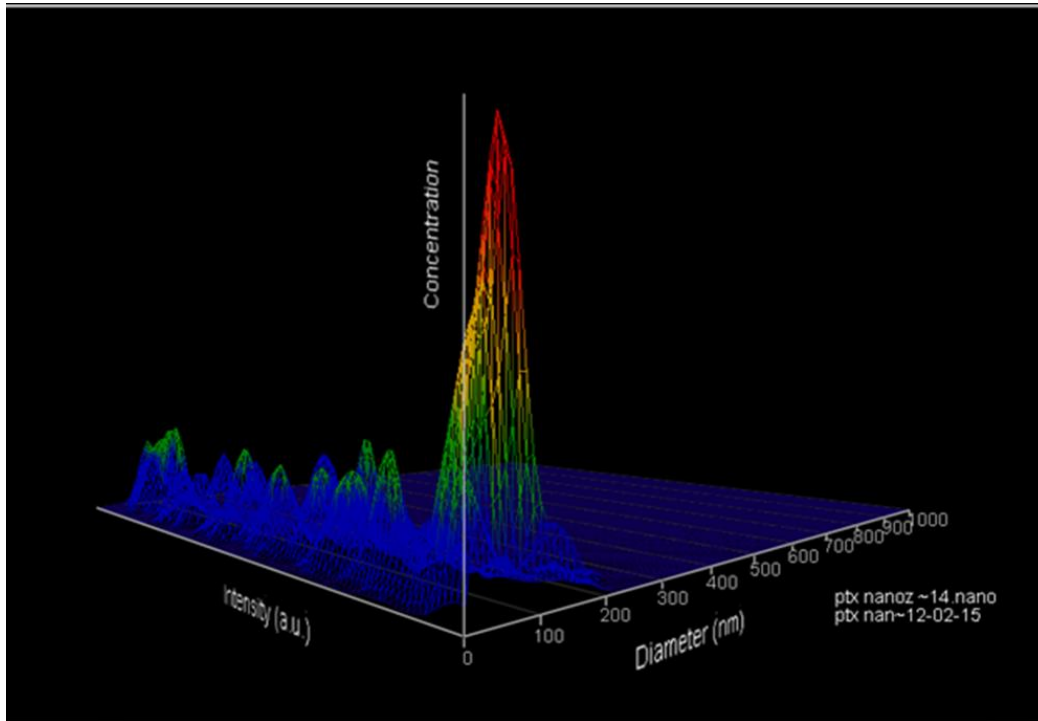
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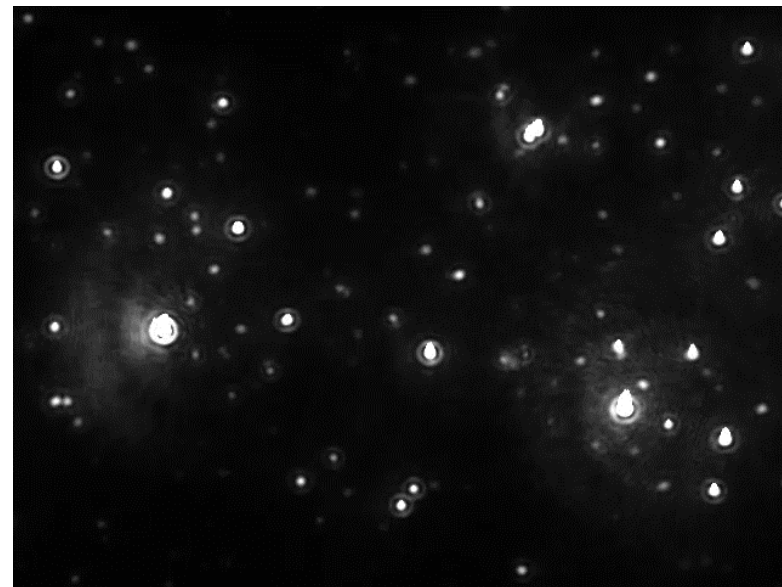




Dynamic Light Scattering



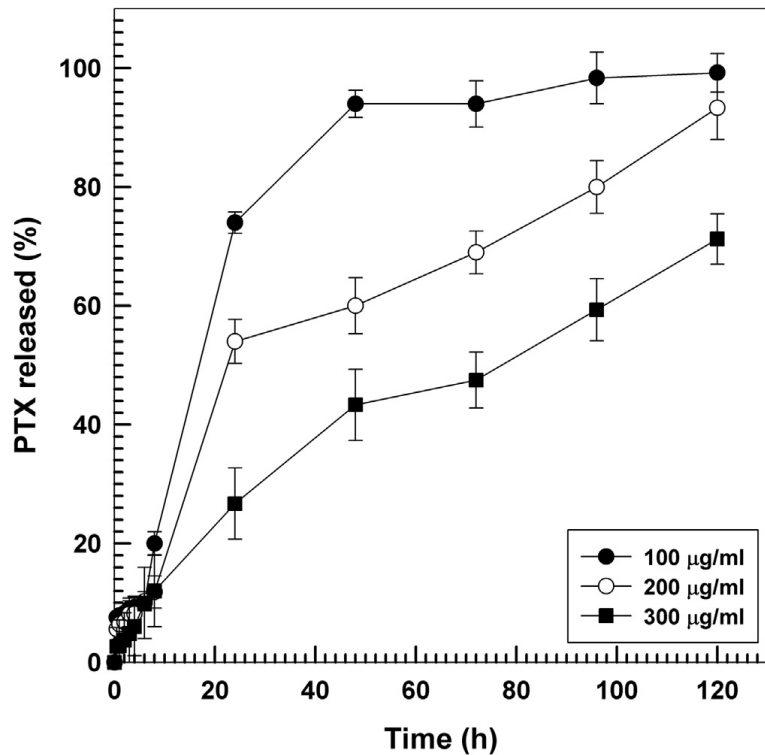
Nanoparticle Tracking Analysis

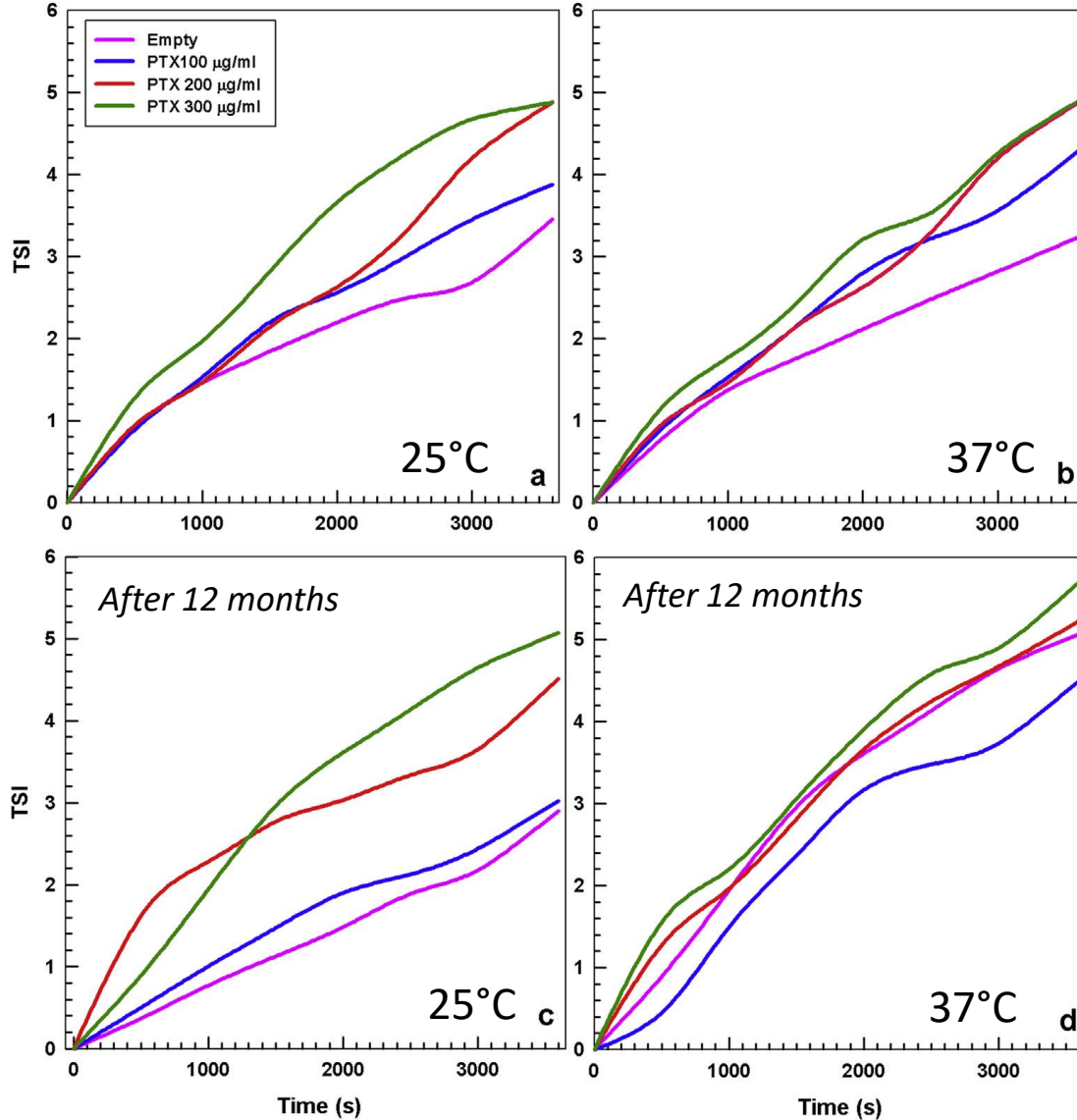


Sample	EE(%)
Empty	-
0.1 mg/ml PTX	30 ± 2.8
0.2 mg/ml PTX	36 ± 3.4
0.3 mg/ml PTX	44 ± 3.6



High Performance Liquid Chromatography



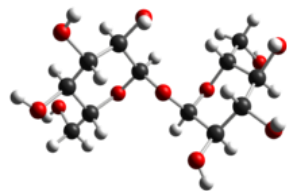


Freeze-drying of PTX-loaded zein nanoparticles

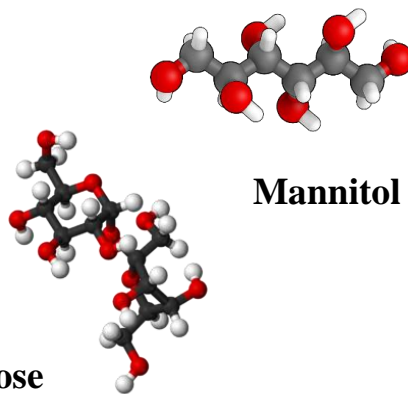
Physico-chemical properties of zein nanoparticles prepared with a PTX concentration of 0.3 mg/ml as a function of different cryoprotectants after the freeze-drying process.

Cryoprotectant	Cryoprotectant concentration (% w/v)	Mean size (nm)	Polydispersity Index	Zeta Potential (mV)
Before lyophilization	-	110 ± 1	0.11 ± 0.01	-34 ± 2.9
-	-	>1000**	0.9 ± 0.05	-25 ± 1.8
Glucose	5%	158 ± 6**	0.21 ± 0.03	-39 ± 3.1
Glucose	10%	450 ± 20**	0.89 ± 0.04	-19 ± 0.1
Mannose	5%	>1000**	0.9 ± 0.08	-21 ± 7.4
Mannose	10%	500 ± 31**	0.66 ± 0.03	-19 ± 8.2
Trehalose	5%	150 ± 2**	0.19 ± 0.01	-35 ± 2.7
Trehalose	10%	166 ± 2**	0.25 ± 0.05	-36 ± 2.6
Sucrose	5%	175 ± 8**	0.27 ± 0.07	-38 ± 5.2
Sucrose	10%	190 ± 9**	0.29 ± 0.09	-37 ± 3.3
Mannitol	5%	160 ± 5**	0.24 ± 0.06	-38 ± 2.1
Mannitol	10%	180 ± 3**	0.19 ± 0.04	-38 ± 3.9

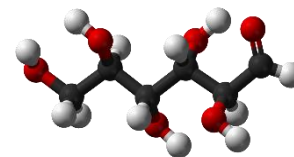
**p < 0.001 (with respect to the formulation before the freeze-drying procedure).



Trehalose



Mannitol

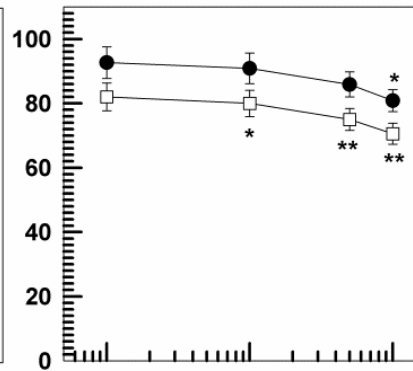
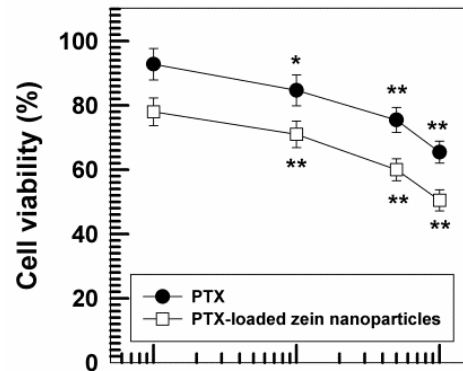
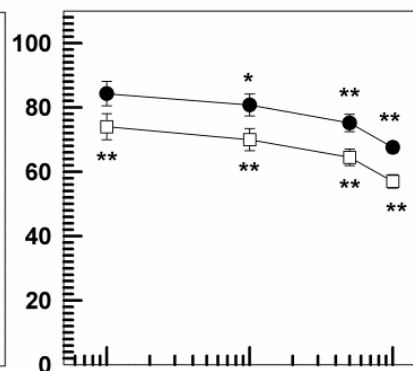
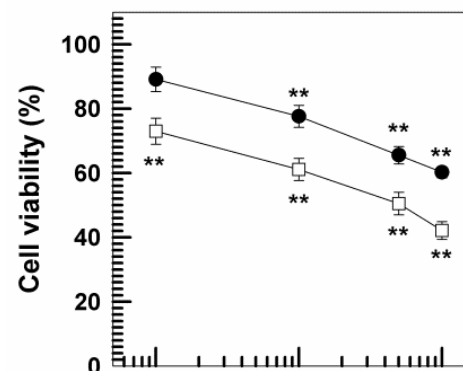
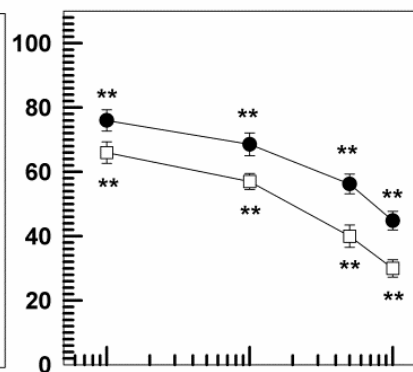
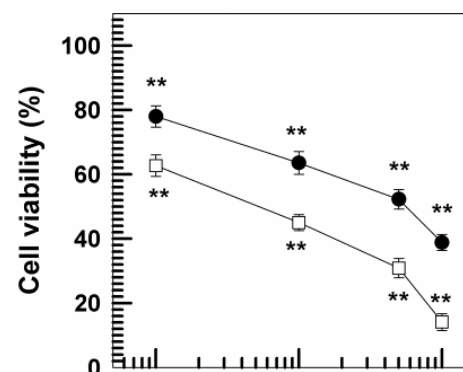
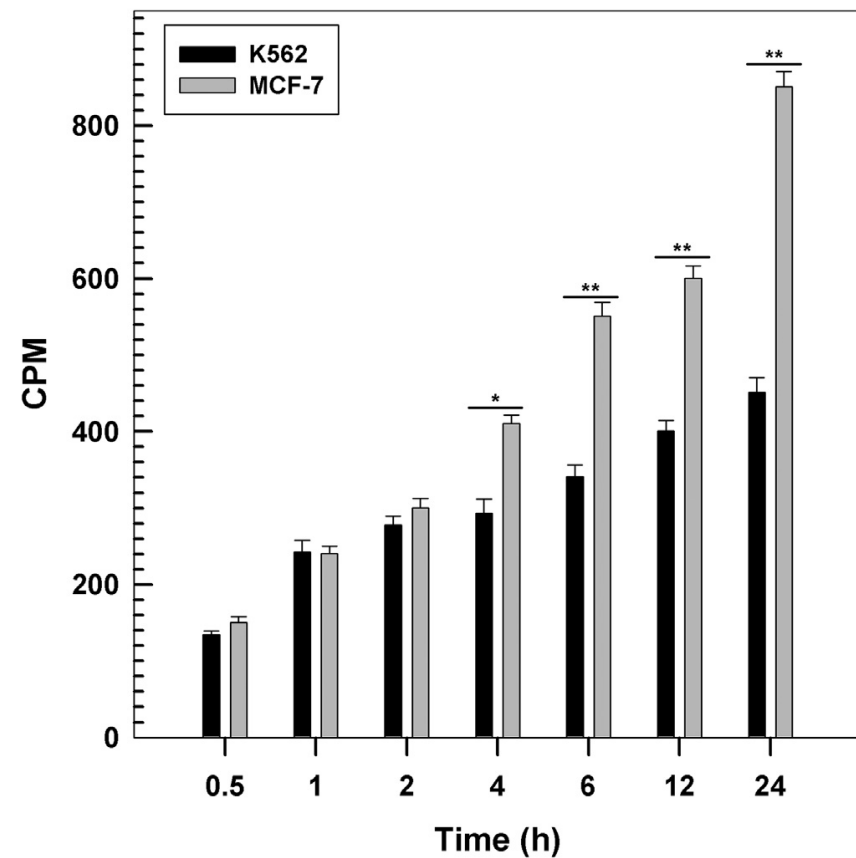


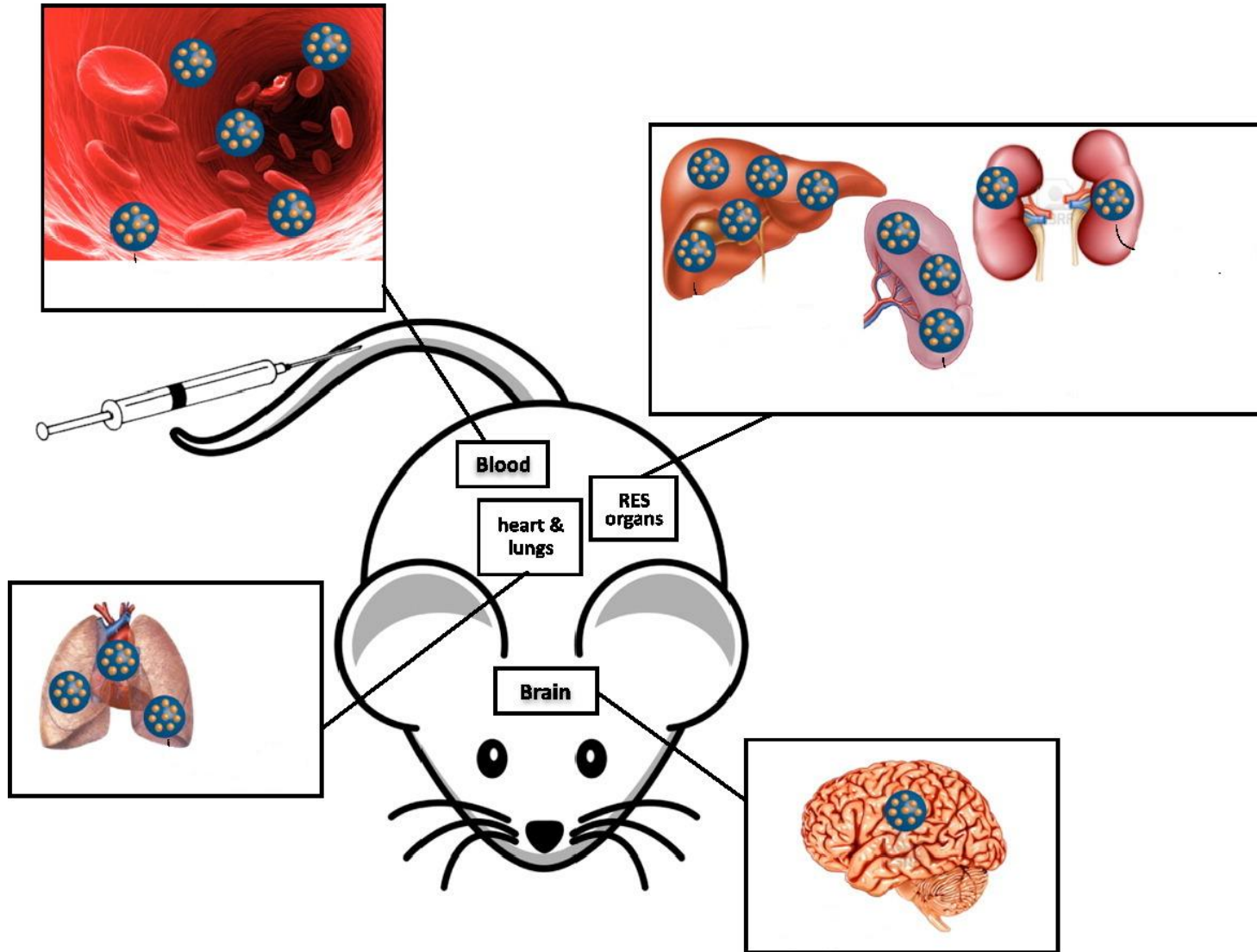
Mannose



Glucose

Sucrose

MCF-7**K562****24 h****48 h****72 h**





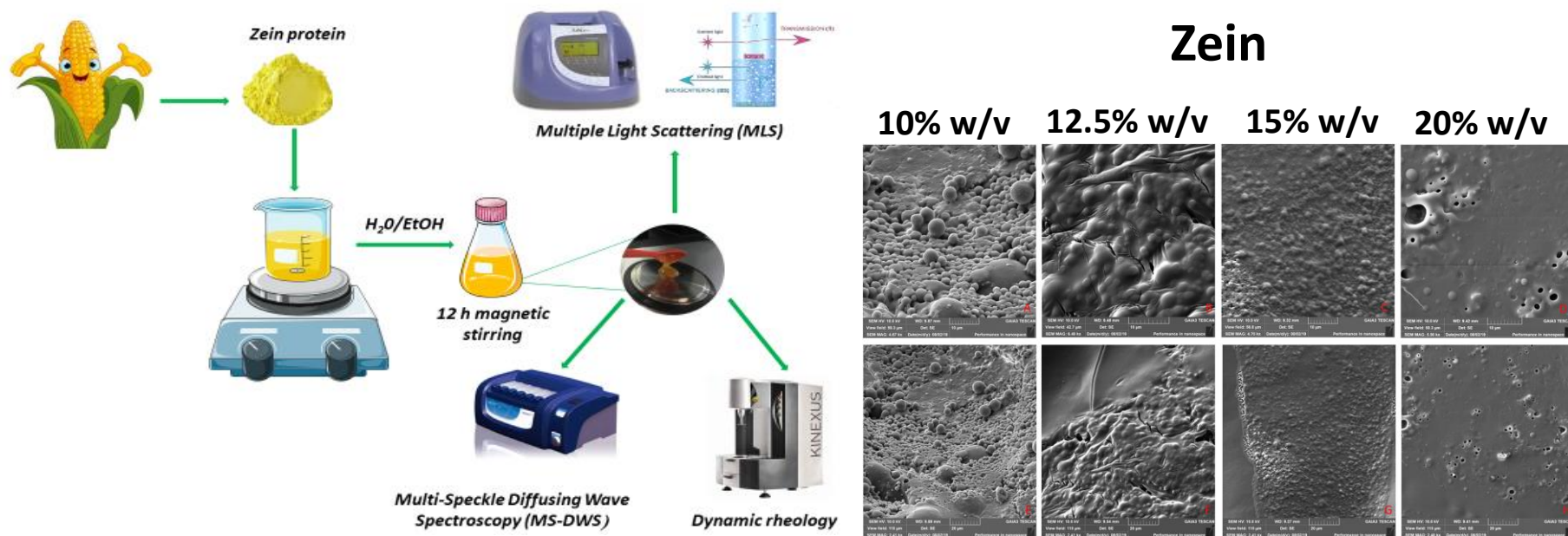
Characterization and refinement of zein-based gels

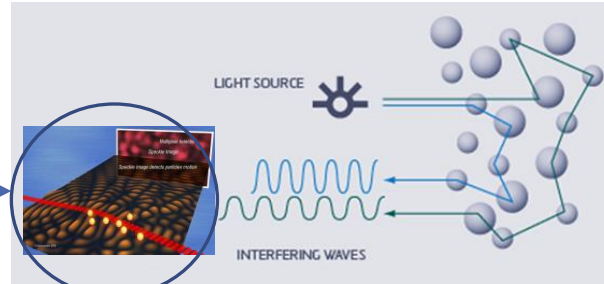
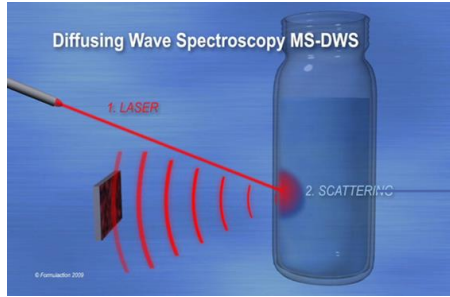
Agnese Gagliardi^{a,1}, Francesca Froio^{a,1}, Maria Cristina Salvatici^b, Donatella Paolino^a, Massimo Fresta^{c,**}, Donato Cosco^{c,*}

^a Department of Experimental and Clinical Medicine, University of Catanzaro "Magna Græcia", Campus Universitario "S. Venuta", I-88100, Catanzaro, Italy

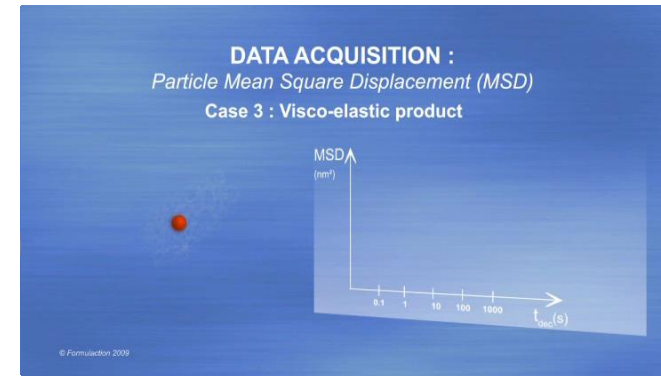
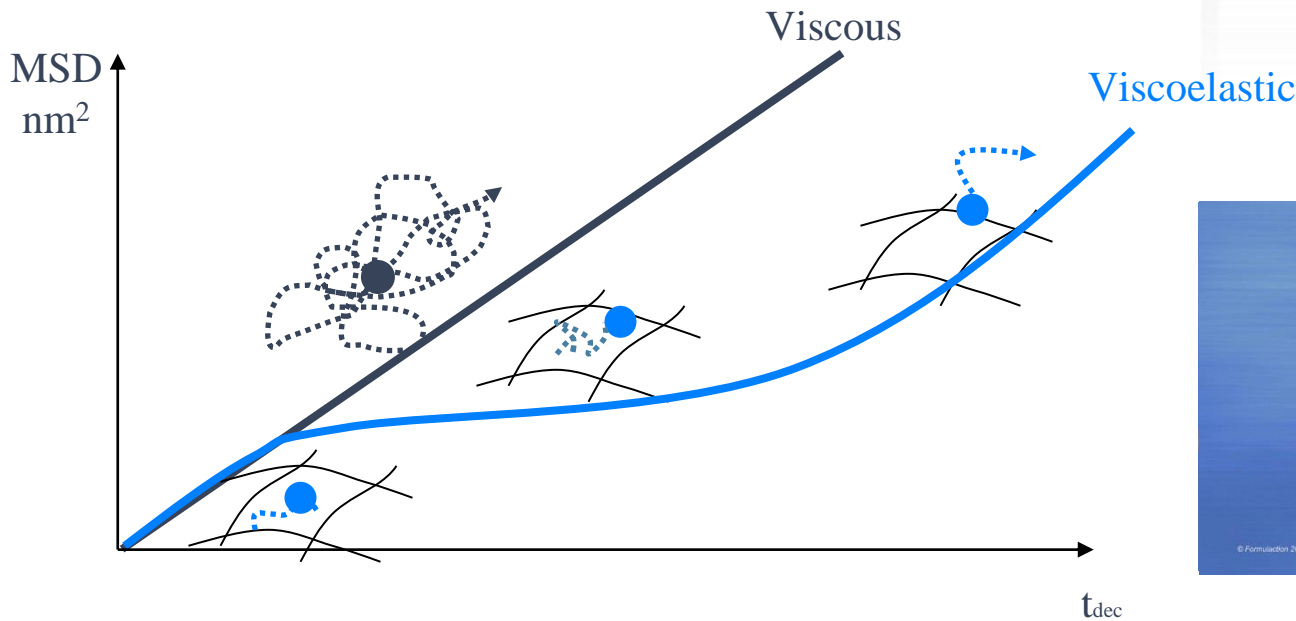
^b CeME-Centro di Microscopie Elettroniche, CNR-ICCOM, Via Madonna del Piano10, 50019, Sesto Fiorentino, Italy

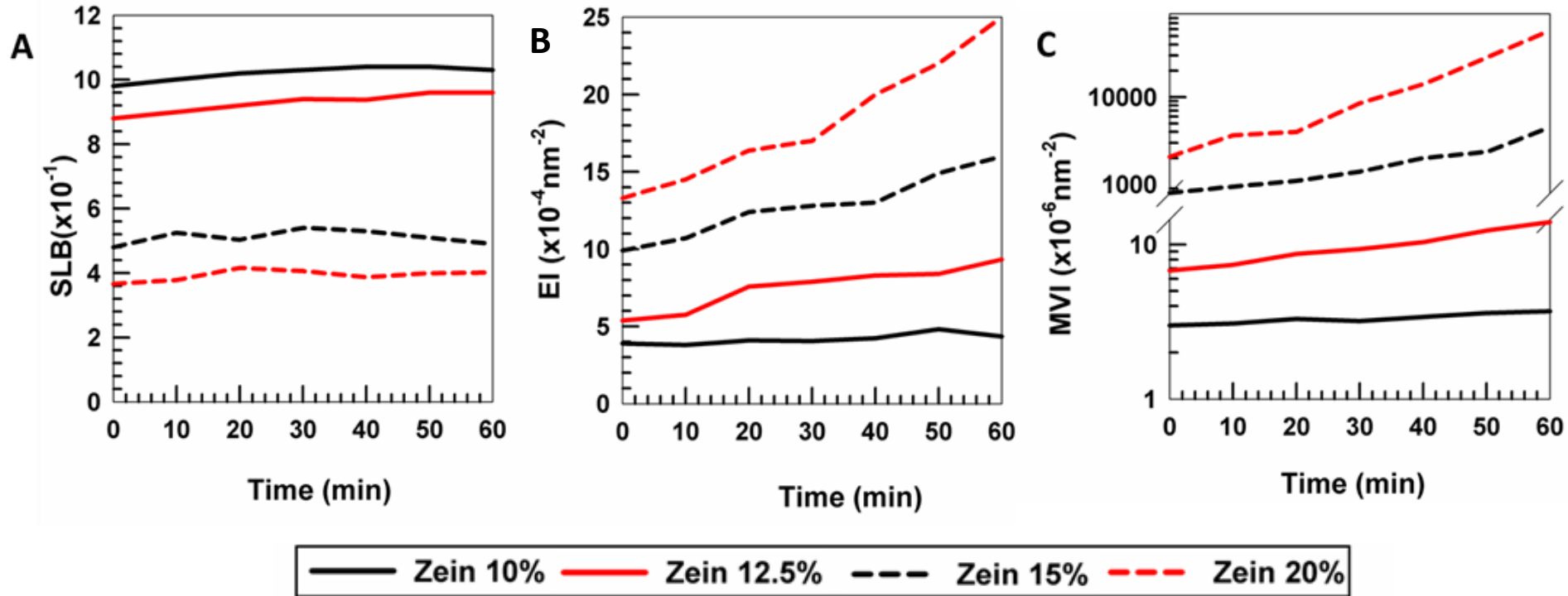
^c Department of Health Sciences, University of Catanzaro "Magna Græcia", Campus Universitario "S. Venuta", I-88100, Catanzaro, Italy





Rheolaser Master®

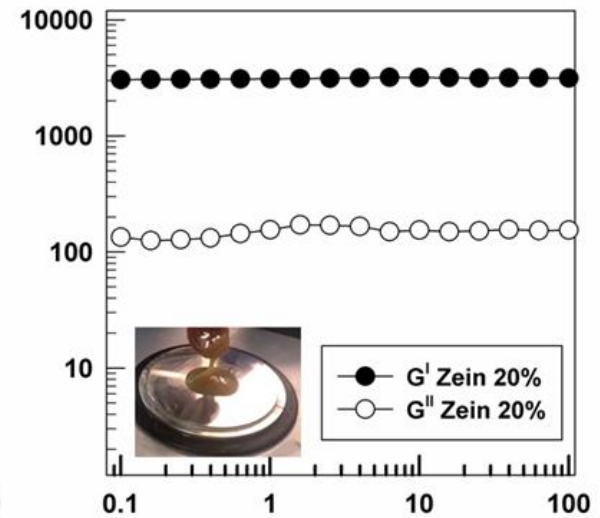
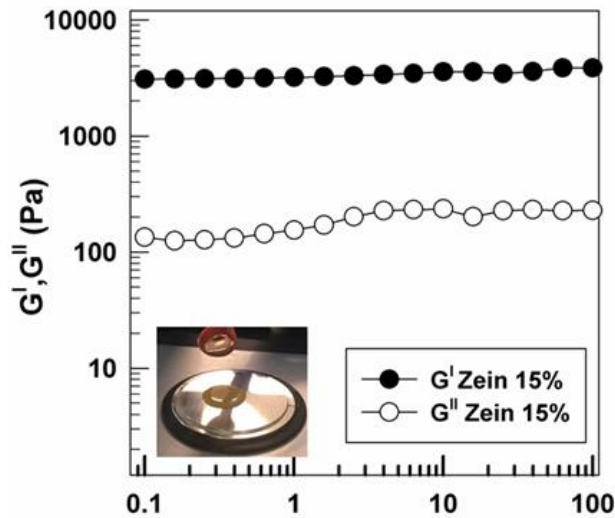
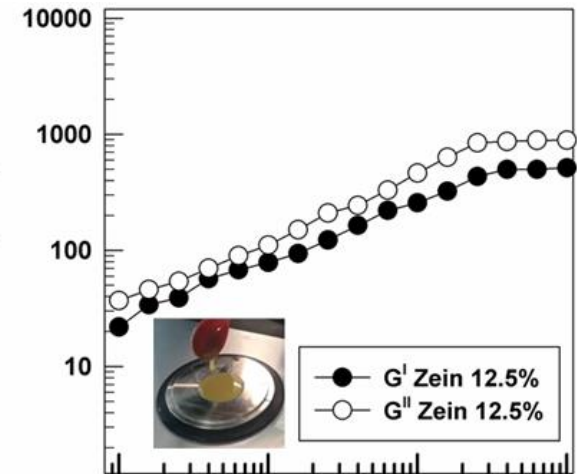
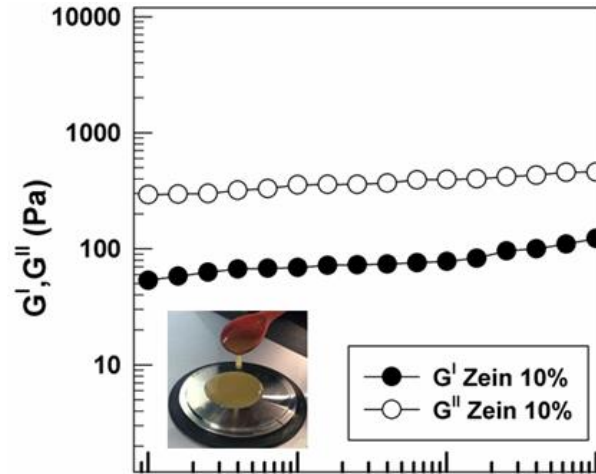
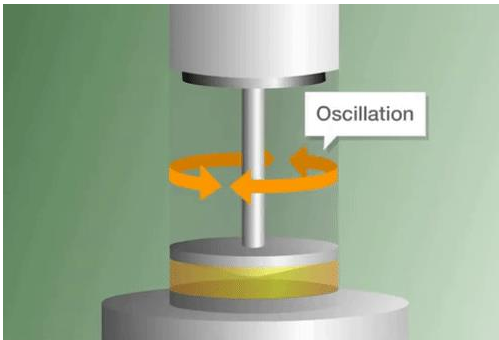




A) Solid-liquid balance (SLB), B) elasticity index (EI) and C) macroscopic viscosity index (MVI) of zein dispersions

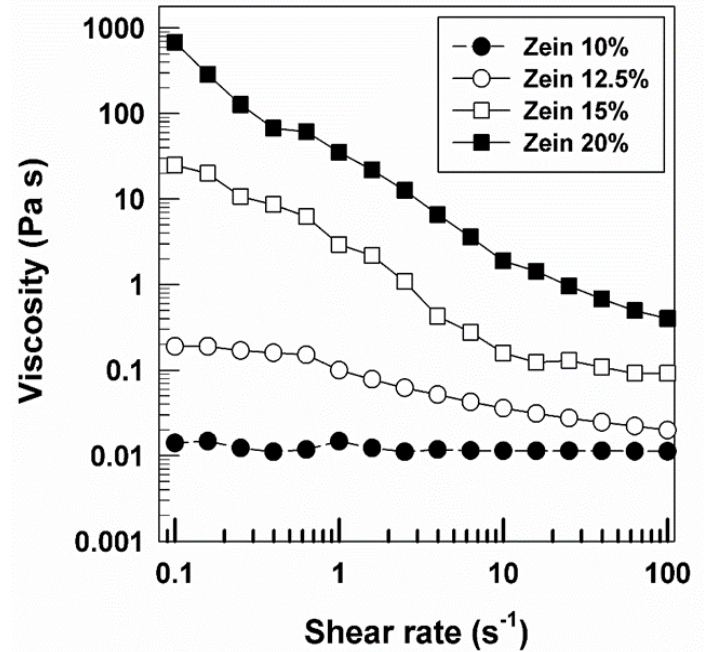
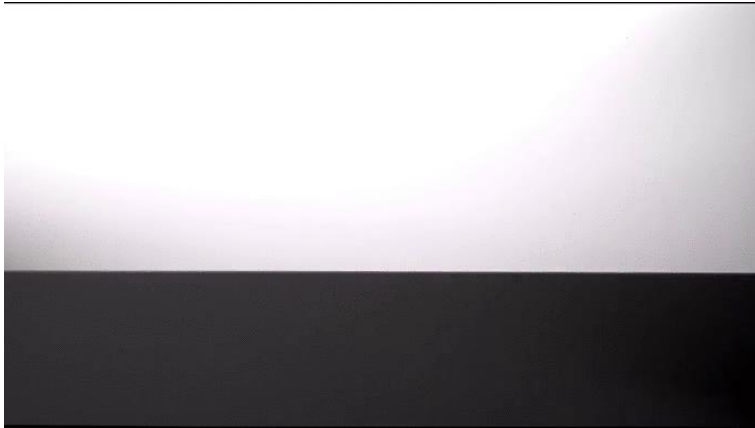


Kinexus Rotational Rheometer®



Frequency (Hertz)

Frequency (Hertz)



Sample

Flow Behavior Index (n)

Consistency coefficient (K)

Coefficient Determination (R²)

Zein 10% w/v

1

0.0252

0.9964

Zein 12.5% w/v

0.90

0.09

0.9943

Zein 15% w/v

0.3065

0.651

0.9947

Zein 20% w/v

0.1318

0.878

0.9969



Future perspectives

Acknowledgements



*Advanced Drug
Delivery Laboratory*

**Maria Chiara Bruno
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Prof. Massimo Fresta



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Laboratory*
Dubium sapientiae initium

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Prof. Antonio Procopio



Prof. Christian Celia



Dr. Roberto Santoliquido

**Thank you very much for your
kind attention**