Nanoscale and Nanoscale Delivery VII

Novel nanohydrogel based on a conjugate between sericin and hyaluronic acidic acid

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CONTROLLED RELEASE SOCIETY
CRS 2024 Annual Meeting AND Exposition
JULY 8-12, 2024 • BOLOGNA, ITALY
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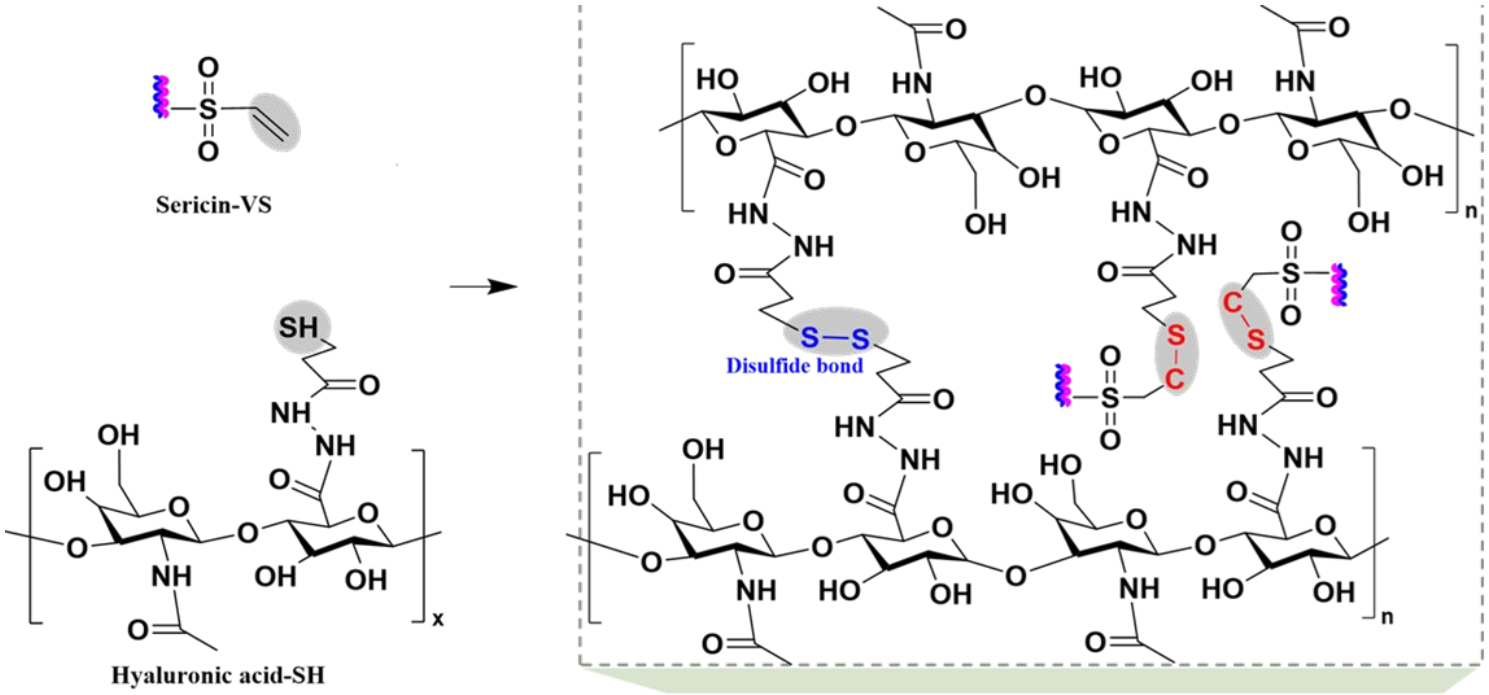
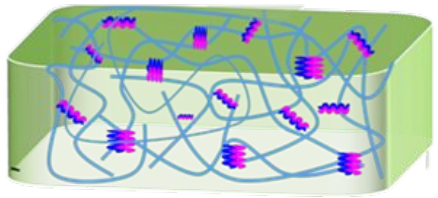
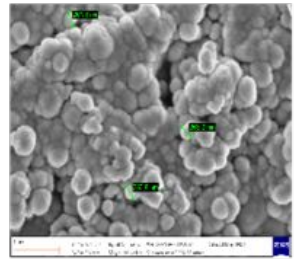
Objectives





Sericin-HA conjugate

Macrohydrogel

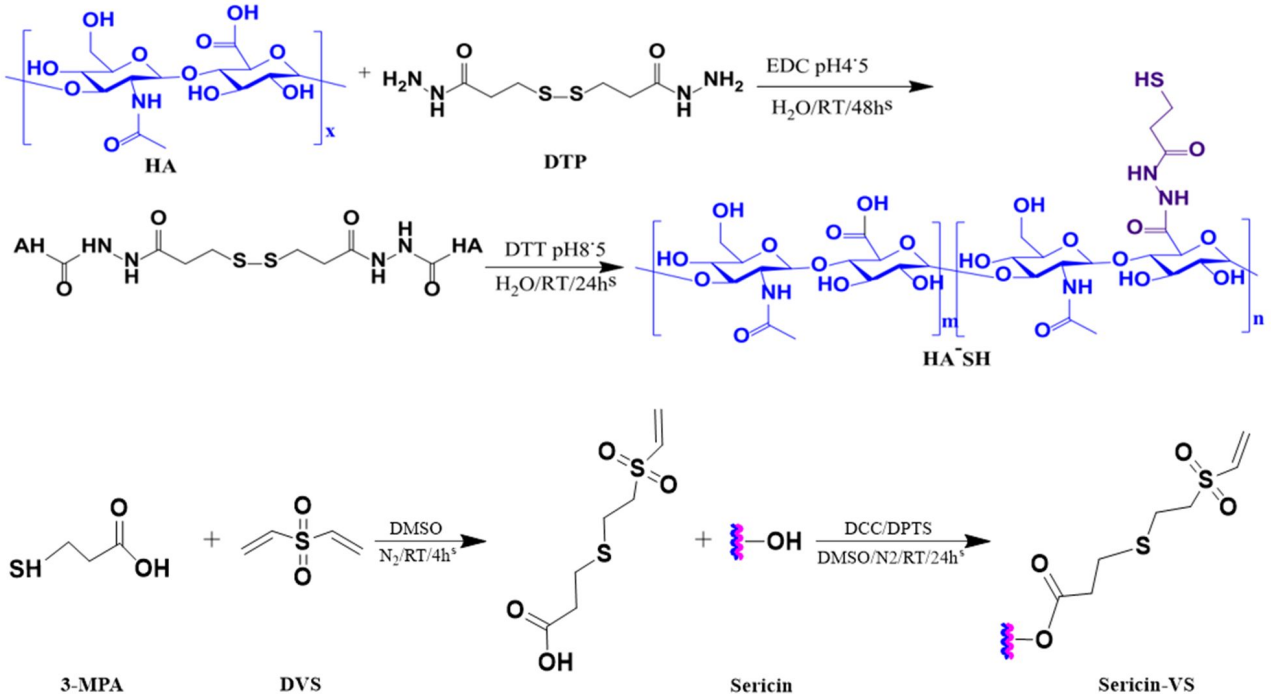


Nanohydrogel

- Synthesis of a novel conjugate sericin-hyaluronic acid
- Formulation of novel macrohydrogels
- Formulation of novel nanohydrogels

- Drug Delivery
- Rigenerative Medicine

Synthesis of thiolated hyaluronic acid (HA-SH) and vinyl sulfonated sericin (Ser-VS)

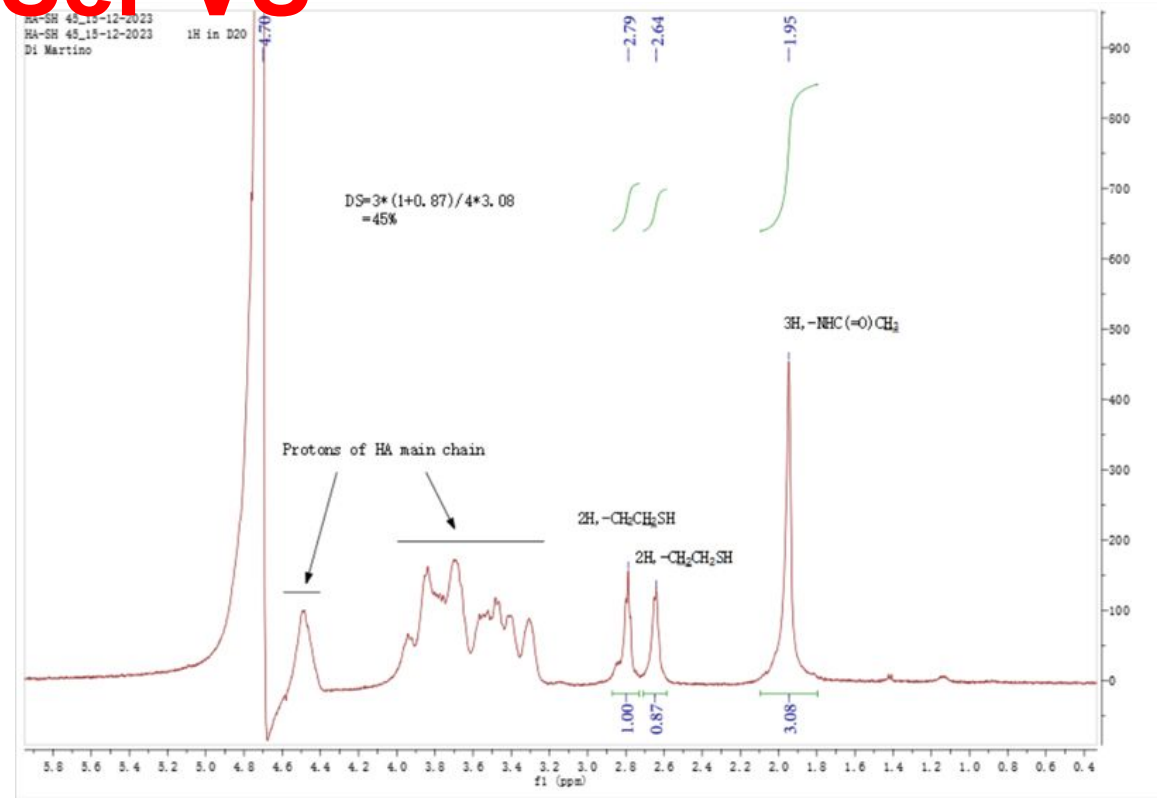


- Sericin has been previously extracted from silkworm and purified by green extraction processes (unpublished data).

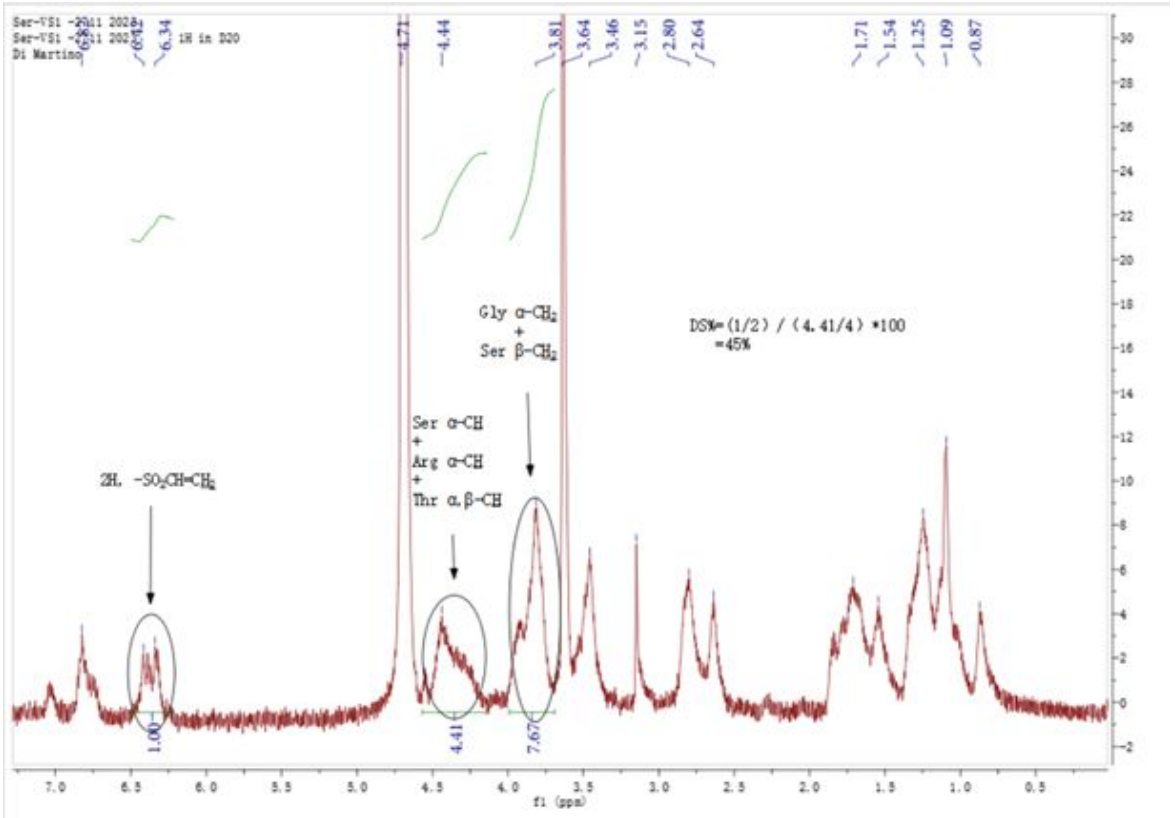
- Formulations of different composition in Ser-VS and HA-SH.

Ser-VS (DS)	HA-SH (DS)		
	10	45	70
3	Gel-A	Gel-B	Gel-C
10	Gel-7	Gel-4	Gel-1
45	Gel-8	Gel-5	Gel-2
87	Gel-9	Gel-6	Gel-3

Determination of the DS% by H-NMR for HA-SH and Ser-VS

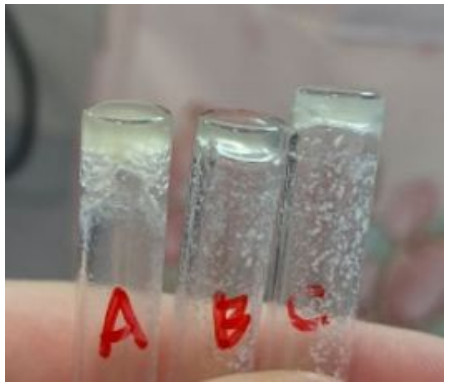


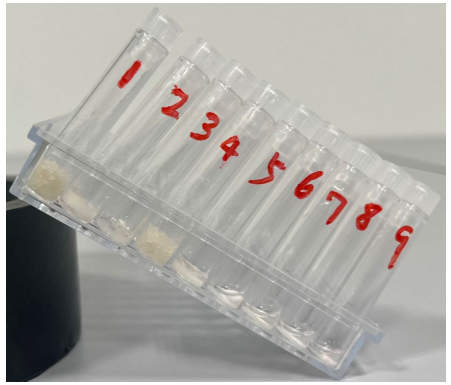
DS%(-SH)=45%



DS%(-VS)=45%

Gelation time of HA-SH and Ser-VS





Ser-VS (VS)	HA-SH (DS)		
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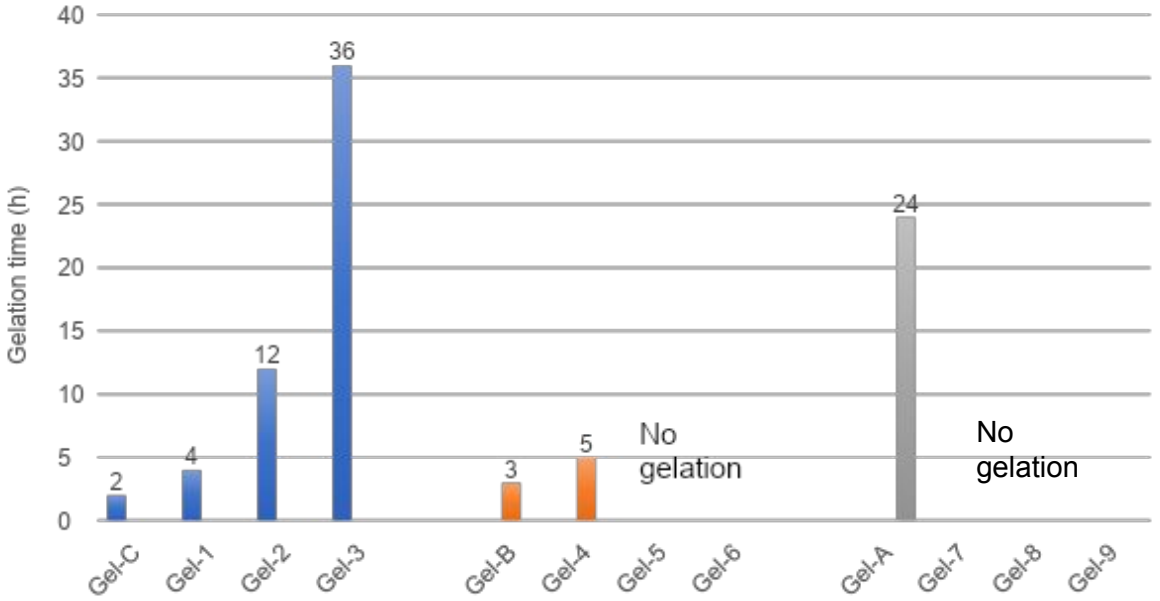
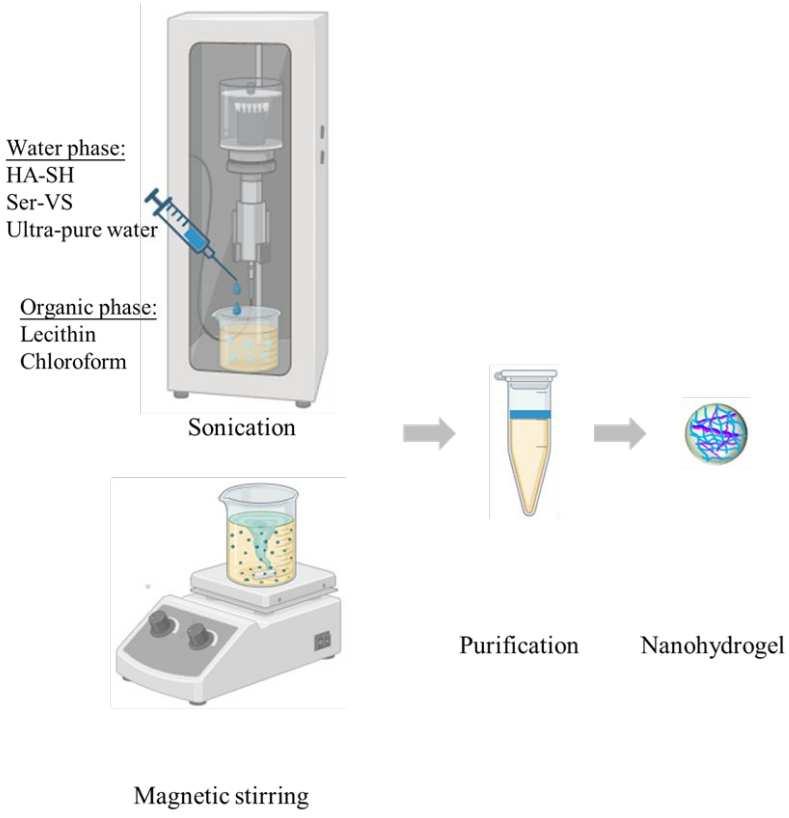
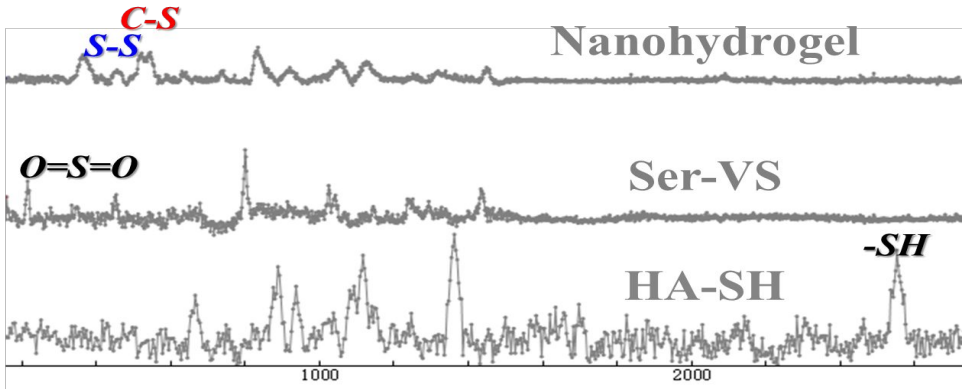
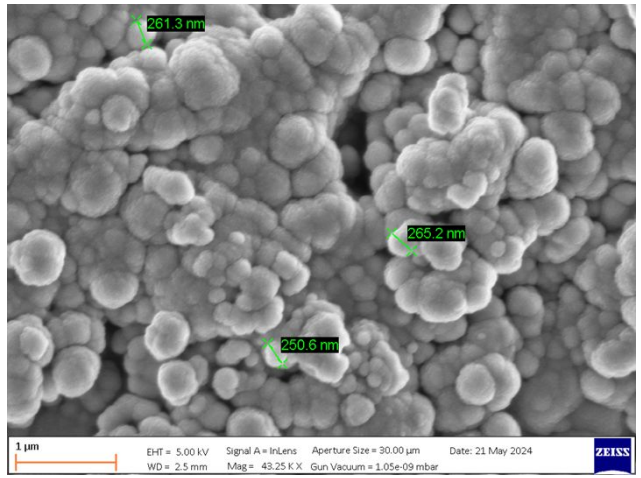


Formulation of nanohydrogel







Formulations	Size (nm)	PDI	Zeta potential (mV)
Nano-C	267	0.22	-44
Nano-1	256	0.42	-47
Nano-2	254	0.37	-32
Nano-3	293	0.44	-25
Nano-4	283	0.39	-34

Conclusio

- Thiolated hyaluronic acid was obtained by carbodiimide chemistry.
- Vinyl sulfonated sericin was obtained by one pot synthesis.
- By the conjugation of sericin-VS and HA-SH, a novel conjugate (macrohydrogel) was formed.
- Nanohydrogels based on Ser-VS and HA-SH were successfully prepared with suitable particle size and zeta potential.

Future

- Rheologic behavior
- Degradation behavior
- Drug release properties
- Nanoparticles improvement
- Cytocompatibility test
- *In vitro* and *in vivo* applications

Thanks to

Progetti di Rilevante Interesse Nazionale PRIN MIUR

Ud'A Università degli Studi "G. d'Annunzio"

UNICAM Università di Camerino 1336

Qisan Ma, Zhuyun Yu, Lucrezia Di Nicolantonio, Maria Rosa Gigliobianco, Cristina Casadidio, Roberta Censi