

# **Wet-Spun Chitosan-Sodium Caseinate Fibers for Biomedicine: from Spinning Process to Physical Properties**

**Hazel Peniche <sup>1,2</sup>, Ivy Ann Razonado <sup>1</sup>, Pierre Alcouffe <sup>1</sup>, Guillaume Sudre <sup>1</sup>, Carlos Peniche <sup>2,3</sup>, Anayancy Osorio-Madrado <sup>3,4\*</sup>, Laurent David <sup>1\*</sup>**

<sup>1</sup>Ingénierie des Matériaux Polymères (IMP), Université Claude Bernard Lyon 1, INSA de Lyon, Université J. Monnet, CNRS, UMR 5223, 69622 Villeurbanne Cedex, France ; [icrazonado@up.edu.ph](mailto:icrazonado@up.edu.ph) (I.A.R.) ; [pierre.alcouffe@univ-lyon1.fr](mailto:pierre.alcouffe@univ-lyon1.fr) (P.A.) ; [guillaume.sudre@univ-lyon1.fr](mailto:guillaume.sudre@univ-lyon1.fr) (G.S.)

<sup>2</sup>Biomaterials Center, Faculty of Chemistry, University of Havana, 10600 Havana, Cuba; [hazel@biomat.uh.cu](mailto:hazel@biomat.uh.cu) (H.P.); [peniche@fq.uh.cu](mailto:peniche@fq.uh.cu) (C.P.)

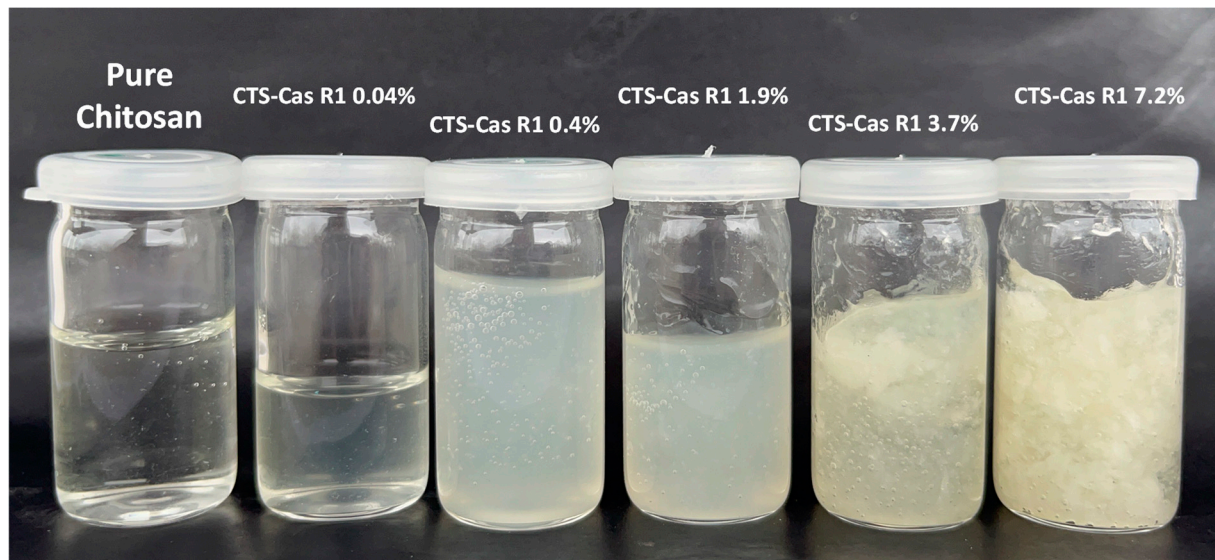
<sup>3</sup>Friedrich Schiller University of Jena, Laboratory of Organic and Macromolecular Chemistry; Jena Center for Soft Matter JCSM; and Center for Energy and Environmental Chemistry Jena CEEC, 07743 Jena, Germany

<sup>4</sup>University of Bayreuth, Laboratory of Organ Printing, 95447 Bayreuth, Germany

\* Correspondence: [anayancy.osorio.madrado@uni-jena.de](mailto:anayancy.osorio.madrado@uni-jena.de) (A.O.-M.); [laurent.david@univ-lyon1.fr](mailto:laurent.david@univ-lyon1.fr) (L.D.)

**Table S1.** Formulation and pH of mixed chitosan/sodium caseinate collodions for processing route R1.

| Formulation Parameter                 |                                   | Pure Chitosan | CTS-R1 Cas 0.04% | CTS-R1 Cas 0.4% | CTS-R1 Cas 1.9% | CTS-R1 Cas 3.7% | CTS-R1 Cas 7.2% |
|---------------------------------------|-----------------------------------|---------------|------------------|-----------------|-----------------|-----------------|-----------------|
| $m_{\text{chi}}$ (g)                  | Mass of engaged chitosan          | 3             | 0.75             | 0.75            | 0.75            | 0.75            | 0.75            |
| $m_{\text{Cas}}$ (mg)                 | Mass of engaged Sodium Caseinate  | 0             | 9.6              | 95.5            | 477.6           | 955.1           | 1910.2          |
| $m_{\text{H}_2\text{O}}$ (g)          | Mass of water                     | 47.96         | 23.98            | 23.98           | 23.980          | 23.98           | 23.98           |
| pH                                    | After collodion mixing            | 4.74          | 4.90             | 5.12            | 5.18            | 5.32            | 5.94            |
| $c_{\text{chi}}$ (%w/w)               | Mass fraction of chitosan         | 3.03          | 3.03             | 3.03            | 3.03            | 3.03            | 3.03            |
| $c_1=c_{\text{cas}}$ (%w/w)           | Mass fraction of sodium Caseinate | 0             | 0.04             | 0.4             | 1.9             | 3.7             | 7.2             |
| $r_1= m_{\text{Cas}}/ m_{\text{chi}}$ | Caseinate/chitosan mass ratio     | 0             | 0.013            | 0.13            | 0.64            | 1.27            | 2.55            |



**Figure S1.** Aspect of pure chitosan solution and mixed collodions prepared at different sodium caseinate concentrations  $c_1=c_{\text{cas}}$ , ranging from 0.04% w/w to 7.2 %w/w, and constant chitosan concentration of  $c_{\text{chi}}\sim 3\%$ . The photograph was taken 12h after mixing. At a sodium caseinate concentration of 7.2% w/w, the system is a gel in this vial flow experiment.