Crosslinked Chitosan-Gelatin biocompatible nanocomposite as a neuro drug carrier.

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Supplementary Information

X-RAY DIFFRACTION

Figure S1 gives the diffractogram of pure chitosan and gelatin. This characterization was to study the crystallinity of chitosan, gelatin and the composites of chitosan/gelatin. The semi-crystalline nature of chitosan and the highly amorphous nature of gelatin are evident from the XRD spectrum. Two characteristic peaks are visible in the chitosan spectrum represented in Figure S1 (B) at 11 and 20°. The gelatin spectrum shows a wide XRD peak at 21°, as seen in Figure S1 (A). This indicates its amorphous nature and the renatured collagen which has a triple helical structure.

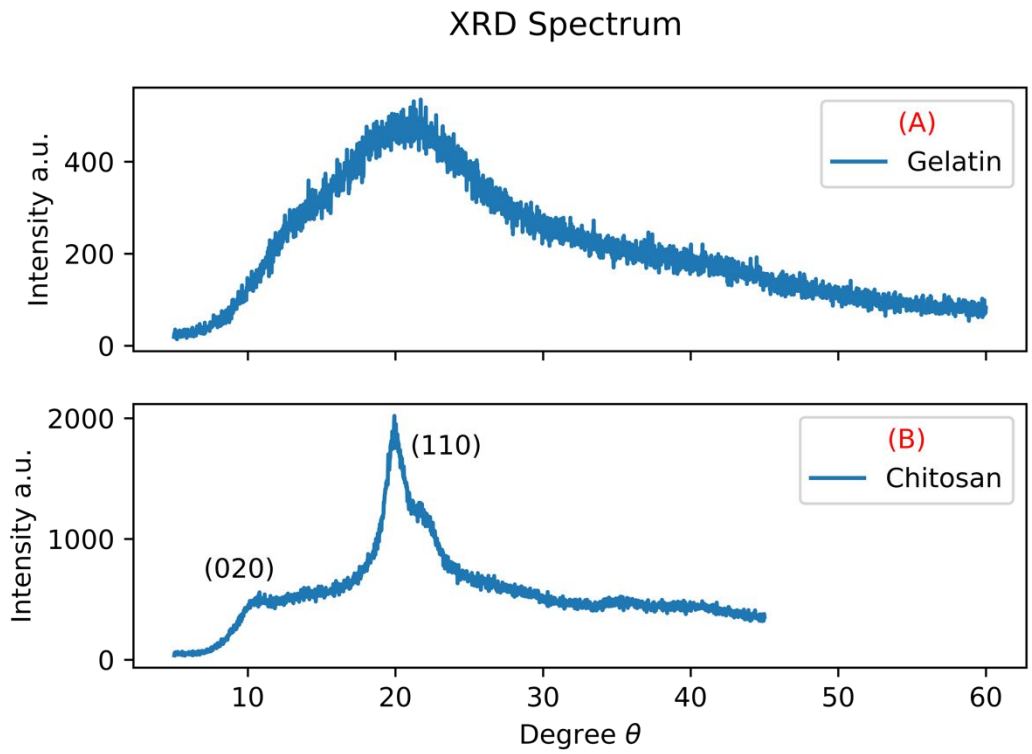


Figure.S1 (A) XRD Spectrum of pure gelatin (B) pure chitosan

In Figure S2 (A), the spectrum of the composite in the ratio 1:1 is given. The sharp peaks at 11 and 20°, seen in pure chitosan, is now visible as a wide amorphous peak which suggests that chitosan and gelatin have blended well in the composition. Figure S2 (B) is the XRD spectrum of the chitosan/gelatin composite in the ratio 3:1. As chitosan is present in larger amounts, we see the presence of the chitosan peak at 11°. The wide spectrum at 20° is also reduced, and a more constricted peak is visible. In Figure S2 (C), the highly amorphous nature is evident. This is due to the presence of gelatin in a larger amount as it denotes the XRD spectrum of the chitosan/gelatin of the ratio 1:3. The XRD spectrum of all the samples in different ratios gives accurate peaks, amorphous quality and matches with the chemical composition of the sample.

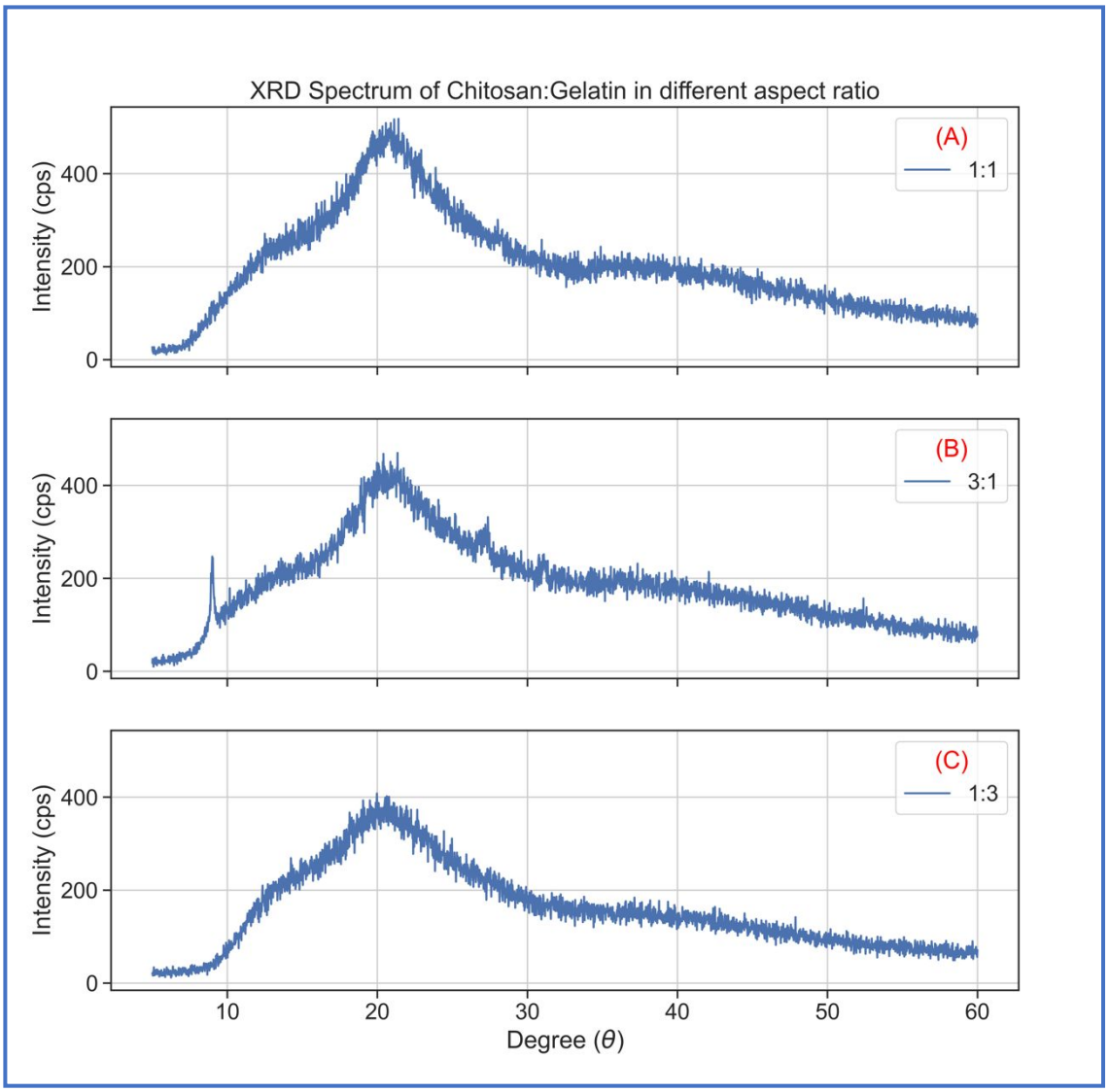


Figure.S2. (A) XRD spectrum of chitosan/gelatin in ratio 1:1 (B) 3:1 (C) 1:3

THERMOGRAVIMETRIC ANALYSIS

The DTA graph shows the presence of endothermic peaks at 100 and 230 °C. The endothermic peak at 100 °C is attributed to the evaporation of adsorbed water and at 250 °C corresponds to the denaturation of gelatin. Therefore, the results of XRD, FTIR, and DTA analyses revealed that the thermal treatment of gelatin solution has no effect on the chemical structure of gelatin. The TGA thermogram of pure chitosan shows a degradation only at 300 °C. On the other hand, the gelatin has a lower tolerance to temperature and shows a degradation peak at 250 °C. In Figure S3, the TGA and DTA thermogram of chitosan/gelatin composite in the ratio 1:1 is

represented. There is a mass loss of 5% at 100°C due to the loss of water molecules. The second degradation peak is seen at around 230 °C. These findings suggested that crosslinking modified the thermal degradation properties of chitosan/gelatin blends, probably because of the hydrogen bond formation and The degradation of the crosslinked composite starts from a lower temperature compared to its constituents. At a temperature of 300 °C, 60% of the initial mass that was loaded in the crucible remained. The residual mass was calculated to be around 60%.

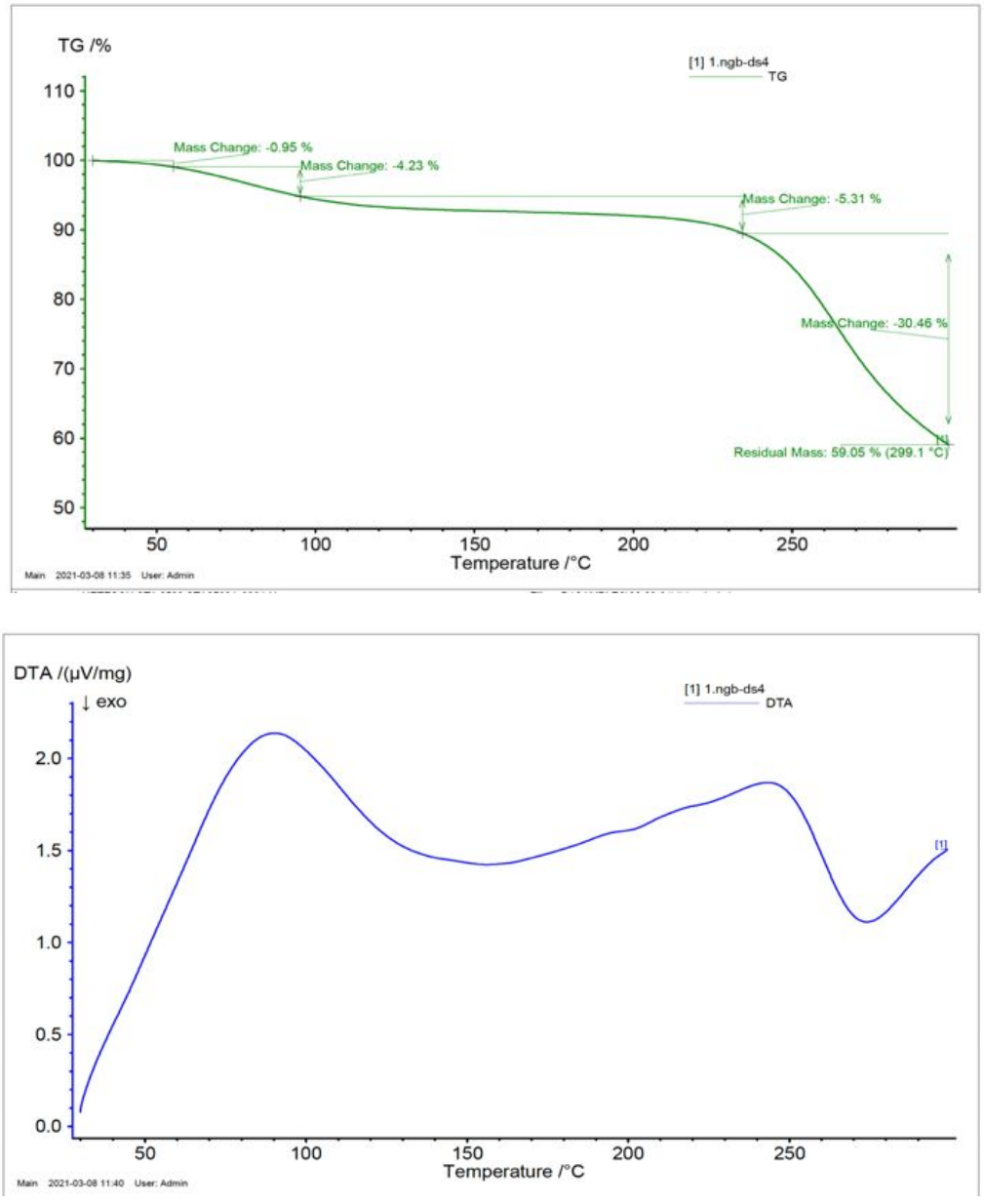
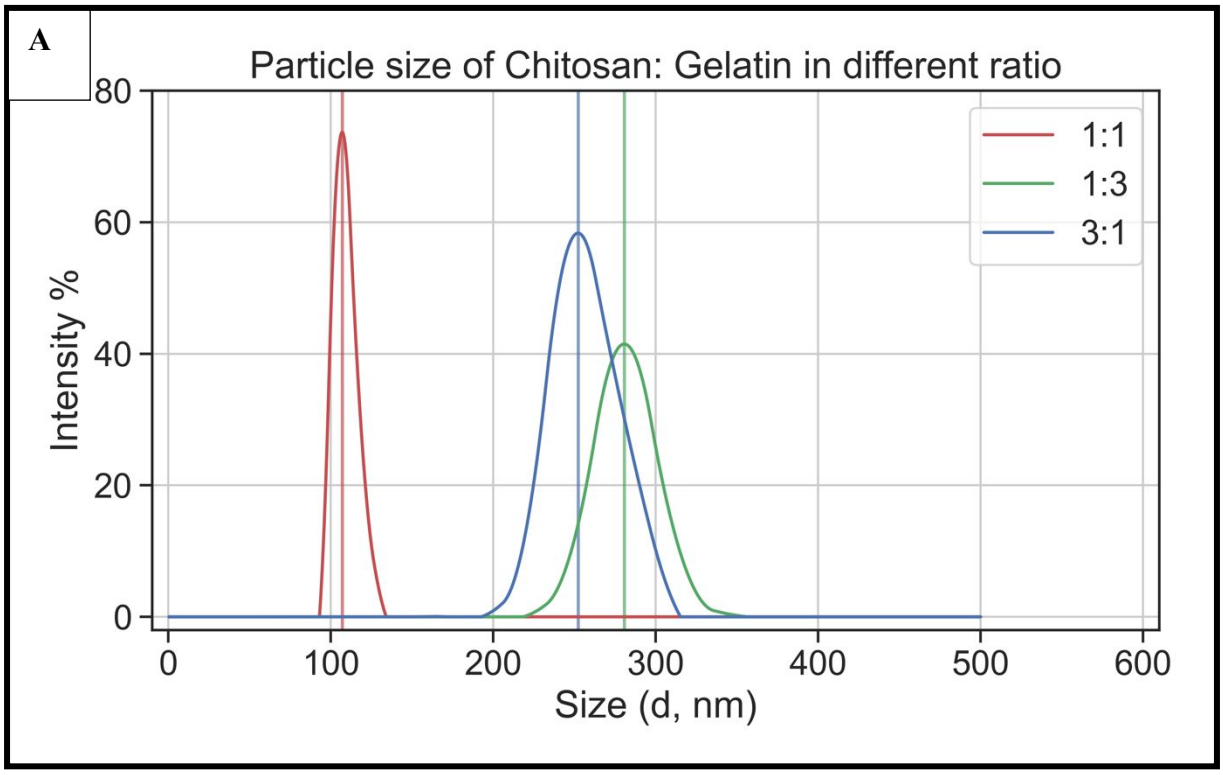


Figure S3. TGA and DTA thermogram of chitosan/gelatin in the ratio 1:1

DYNAMIC LIGHT SCATTERING

The blend of chitosan and gelatin is claimed as nano from the Dynamic Light Scattering(DLS) results. The aim of the work was to reduce the size of the chitosan/gelatin matrix and encapsulate the drug dopamine within the matrix. The particle size of the chitosan/gelatin composite and the drug encapsulated chitosan/gelatin composite was determined by DLS, and the results are plotted below. From these evidences, the authors claim that the system is a nanocomposite.



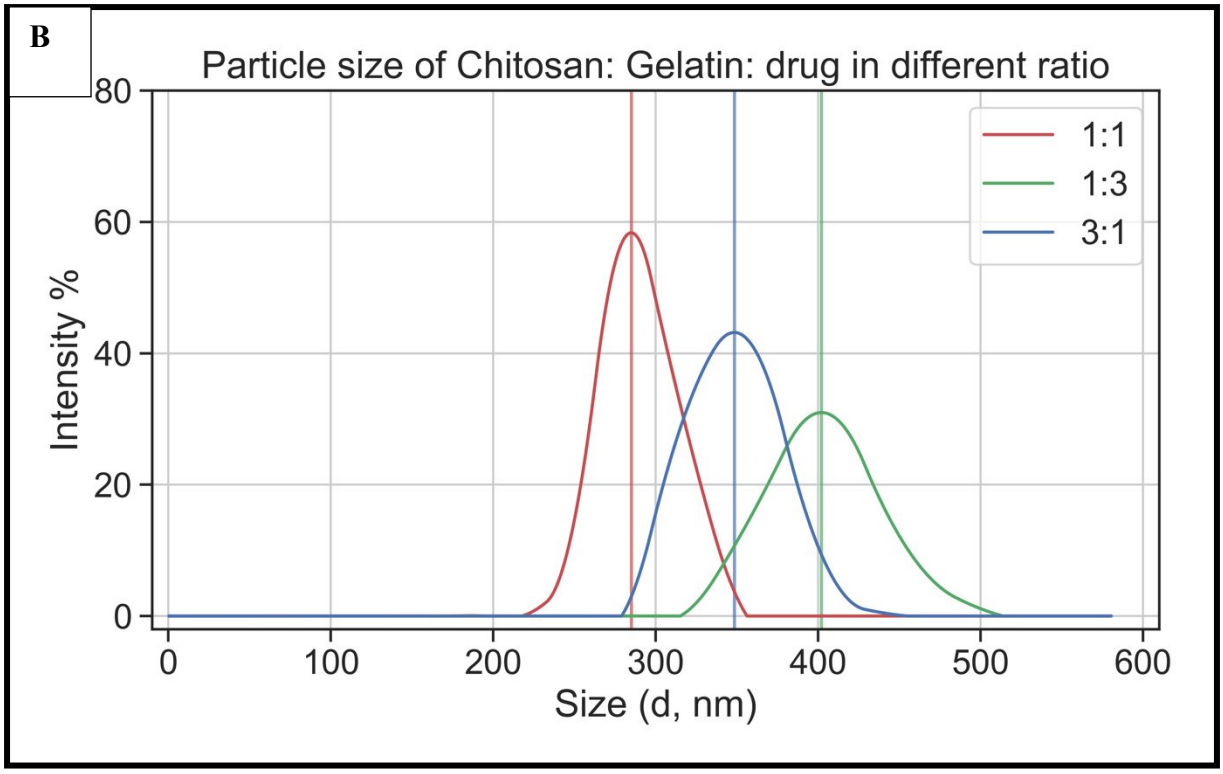


Figure S4. (A) Particle size of chitosan/gelatin in the ratio 1:1,1:3 and 3:1 (B) Particle size of drug encapsulated chitosan/gelatin in the ratio 1:1, 1:3 and 3:1.