Supramolecular hydrogels as a structural analogues of ECM proteoglycans

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Extracellular matrix (ECM) is a dynamic network which supports surrounding cells and regulate many cell functions. Glycosaminoglycans are a class of macromolecules, present in ECM, responsible for the common modification of the proteins which can change their structure and function and, so, modulate cell behavior. Due to the dynamic interactions in the native cellular environment, supramolecular hydrogels have been designed to mimic these molecules since they present great biochemical and mechanical properties.
Another advantage of these materials is their ability to self-assemble from bioactive units in ordered structures through reversible and covalent interactions.
Hereupon, we demonstrate here the conjugation, through carbodiimide chemistry, of a well-known dipeptide amphiphile (N-fluorenylmethoxycarbonyl diphenylalanine, Fmoc-FF) with a monossacharide (D-glucosamine-6-phosphate) for the assembly of a nanofibrous hydrogels as a structural analogues of the ECM proteoglycans.
In order to identify the conjugate and measure the purity of the reaction, mass spectrometry and HPLC was used. The glycopeptide was also characterized through circular dichroism and fluoresence spectroscopy to study the molecular arrangement.
Cell encapsulation, targeted delivery and the gelation process with different saccharide units will be further explored.