

# Glycosylated dipeptides as hydrogelators: design, synthesis and characterization

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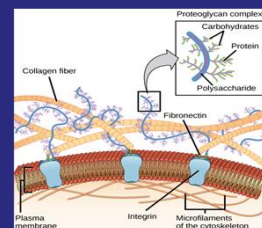
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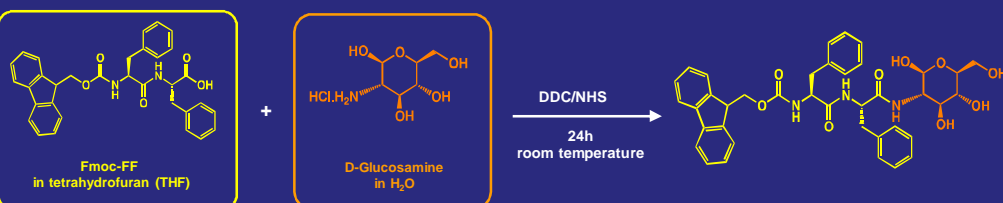
## INTRODUCTION

In multicellular organisms, cells are surrounded by an acellular dynamic assembly known as extracellular matrix (ECM). It undergoes constant remodeling via assembly and disassembly of its components and thus, the use of supramolecular chemistry seems a straightforward approach for the design of its mimics. ECM provides a wealth of bioinformation coded by its components at spatial and functional level. So far, peptide amphiphiles that copycat specific sequences of ECM proteins have been mainly used as building blocks in supramolecular bioapproaches. However, ECM contains another class of biomolecules - glycans - that do also play important roles in matrix structuring and function.

Herein, we propose to assemble supramolecular gels from short glycosylated peptide amphiphiles as a structural analogues of ECM proteoglycans. Previously, it has been shown that the dipeptide diphenylalanine (FF) can self-assemble directionally and form long nanofibers.<sup>1,2</sup> When FF is functionalized with aromatic capping groups, it can further assemble into nanofibrous hydrogels.<sup>3</sup> Inspired by these previous findings, we conjugated a monosaccharide (glucosamine, galactosamine) to N-fluorenylmethoxycarbonyl diphenylalanine (Fmoc-FF) through N,NqDicyclohexylcarbodiimide/ N-hydroxysuccinimide (DCC/NHS) coupling.



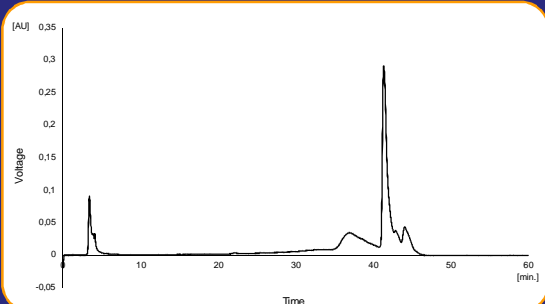
## MATERIALS AND METHODS



## PURIFICATION

### High Performance Liquid Chromatography (HPLC)

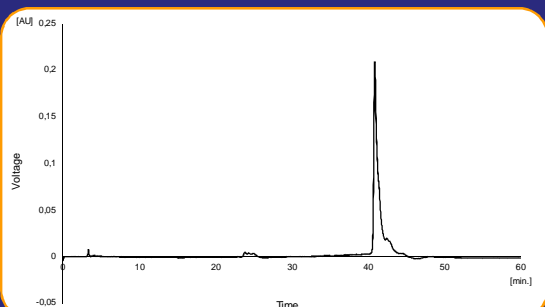
The conjugate was analysed through analytical HPLC to measure the purity.



Chromatogram of the crude glycopeptide

**Column:** Atlantis T3 5µm, 4.6x250mm  
**Gradient:** 20% to 80%ACN in H2O (0.1%TFA)  
**Flow:** 1ml/min  
=280nm  
**Purity**=60,93 %

The main peak was separated through semi-preparative column with flow 8ml/min

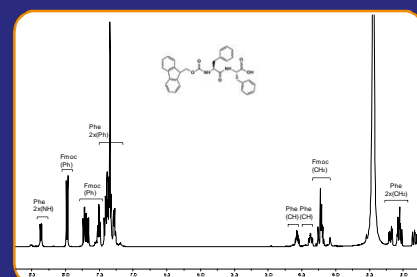


Chromatogram of the pure glycopeptide

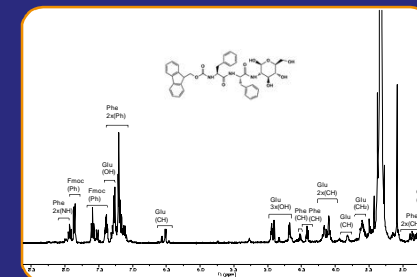
**Column:** Atlantis T3 5µm, 4.6x250mm  
**Gradient:** 60% to 85%ACN in H2O (0.1%TFA)  
**Flow:** 8ml/min  
=280nm  
**Purity**=96,01 %

## CHARACTERIZATION

### Nuclear Magnetic Resonance (<sup>1</sup>H NMR)

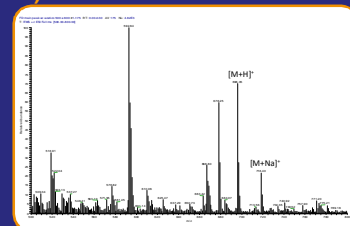


Spectrum of the peptide (Fmoc-FF) without modification



Spectrum of the glycopeptide (Fmoc-FF-D-Glucosamine)

### Electrospray Ionization Mass Spectrometry (ESI-MS)



Molecule name	Molecule identification by ESI-MS	
	Expected mass (g/mol)	Observed mass (g/mol)
Fmoc-FF-glucosamine	696.76 [M+H] <sup>+</sup>	696.05 [M+H] <sup>+</sup>

## CONCLUSIONS AND FUTURE WORKS

The glycopeptide was successfully synthesized and purified with 96% of purity. The gelation process is on going work and different saccharide units will be used to investigate their influence on assembly process of the gels. Cell encapsulation and targeted delivery will be further explored.

### References:

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- Zhou, M. *et al. Biomaterials* **30**, 2523, 2530 (2009).
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### Acknowledgments:

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