Conjugation and Interaction Studies of Thiol Peptide-based Hydrogels and Peptide Nucleic Acids

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Peptide Nucleic Acids (PNAs) are synthetic analogues of nucleic acids whose backbones consist of *N*–(2-aminoethyl)glycine repeats, anchored via amidic bonds.[1] The exceptional physicochemical properties, together with the remarkable stability in biological fluids and the extremely low toxicity, have made PNAs among the most valuable nucleic acid mimetics to be employed for smart delivery purposes as well as for the development of new diagnostic tools.[2,3] On the other side, ultrashort aromatic peptide-based multicomponent hydrogels (HGs) have been largely employed as biocompatible matrices for several applications in biotechnology, ranging from tissue engineering, drug delivery, and biosensor production. One of the most explored hydrogelators is the low molecular-weight Fmoc-FF (*N*α-fluorenylmethoxycarbonyl-diphenylalanine) homodimer due to its well-studied gelating properties.[4] From that starting point, the knowledge of Fmoc-FF aggregation properties has been used as a guide to design new peptide-based gelators, with implemented features for the development of smart delivery and/or diagnostic tools.[5] Since hybrid hydrogels are non-toxic, the idea is to employ those matrices as scaffolds for controlled drug release in the presence of a reducing environment, such as the tumour microenvironment.[6] In this regard, the functionalization of mixed (Cys)HG at different molar ratios compared to Fmoc-FF (1/5, 1/10 and 1/20, respectively) with (Cys)PNA molecules via specific and non-specific interactions is shown here, followed by supramolecular characterization through several techniques, such as HPLC, MS, CD, FT-IR, NMR and microscopy.

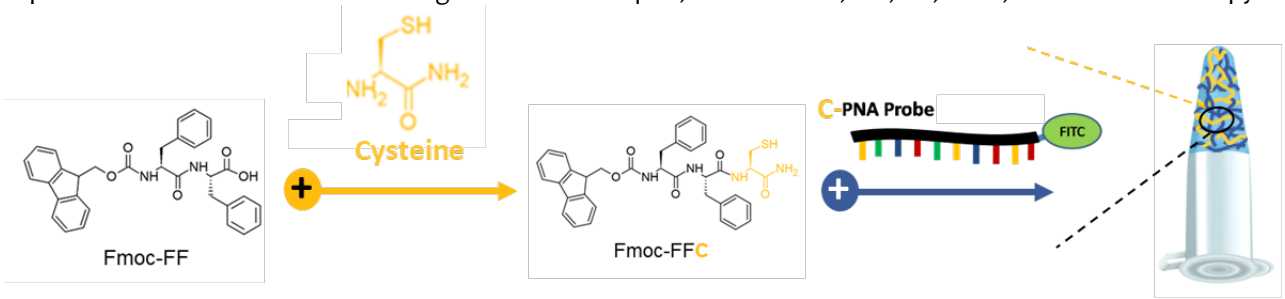

Figure 1. Schematic representation of Fmoc-FFC and C-PNA-FITC probe forming supramolecular hydrogels.

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