

## Supramolecular Hydrogel Induced by Electrostatic Interactions between polycation and negatively charged tripeptide

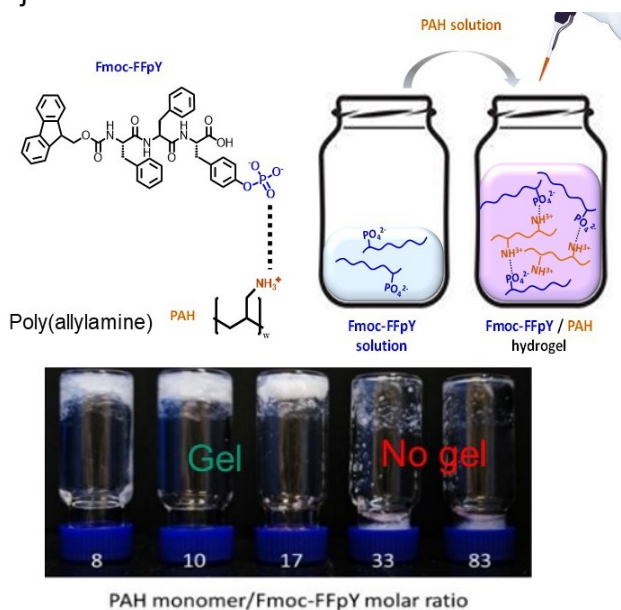
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### ABSTRACT:

Supramolecular hydrogels formed through non-covalent interactions of low molecular weight hydrogelators (LMWH) show great potential applications in different fields. Generally, the self-assembly of LMWH is triggered by a sol-gel process through an external stimulus able to switch their solubility, such as temperature change, pH switch, solvent change, chemical and enzymatic reactions. In this work, we introduce a new strategy to trigger and control the self-assembly of Fmoc-FFpY peptides<sup>1</sup>. The formation of the peptidic hydrogel is obtained instantaneously by direct electrostatic interactions with a polycation without dephosphorylation of the peptides as reported previously<sup>2-3</sup>. The resulting hydrogels show enhanced mechanical properties in comparison to gels of Fmoc-FFpY induced by enzymatic dephosphorylation. Peptide self-assembly yields beta-sheets, revealed by circular dichroism and infrared spectroscopy. Transmission electron microscopy and X-ray diffraction showed the fine structure of the self-assembled fibers. Geometry optimization calculations in the gas phase support a self-assembly model in which polycation chains interact with the peptides through their

phosphate groups and the polycation/peptide entities form parallel beta-sheets and interact through their Fmoc groups in an anti-parallel manner. Characteristic distances predicted are in agreement with X-ray scattering data. This work opens a route towards a new class of self-assembled hydrogels, where Fmoc tripeptides self-assemble by their interaction with polycations. Since the gels form quickly and have superior mechanical properties, applications as injectable biomaterials are foreseen



**Figure:** (a) Schematic representation of the preparation and (b) inverted tube test of the hydrogel obtained by electrostatic interaction between PAH and Fmoc-FFpY.

**KEY WORDS:** Fmoc-FF,  $\pi$ - $\pi$  stacking, polyelectrolytes, X-ray structure

### References (arial 12)

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2. Cécile Vigier-Carriere *et al.* *Angew. Chem Int. Ed.* **2015**, 54, 10198