

Luminescent hydrogels: self-assembly of a tripeptide and carbon nanodots

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Tripeptides are versatile minimal building blocks of supramolecular functional materials, including biocompatible and biodegradable hydrogels. These biomaterials can be used for diverse applications, including regenerative medicine, drug delivery and biocatalysis.[1] Amongst the approaches to design self-assembling motifs based on diphenylalanine [2], the introduction of D-amino acid(s) in D,L-peptides is an attractive strategy to favour self-organisation.[3-6]

The process of self-assembly involves a hierarchical mechanism, which typically proceeds from nucleation spheres, through thin fibrils, to bundled fibers. As a result, the obtained nanostructured systems may display heterogeneous morphologies. However, the addition of another component that hinders self-assembly could prove a successful strategy to avoid bundling, and to halt the assembling process to the fibril state. To this aim, carbon nanodots are added as a functional component to a self-assembling D,L-tripeptide to achieve hydrogels composed of homogeneous fibrils at physiological conditions.[7]

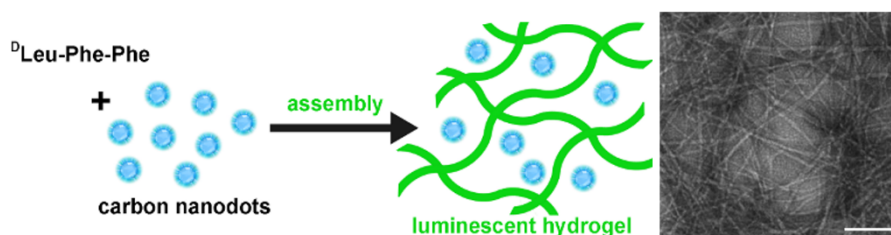


Figure 1. Assembly and TEM micrograph of luminescent hydrogel from a D,L-tripeptide and carbon nanodots. Scale bar = 200 nm.

Investigation of the two-component system revealed experimental conditions that led to stable, luminescent hydrogels, thanks to the unique properties of carbon nanodots.[8] Moreover, it is possible to modulate the rheological properties of the system. These nanocarbon composite materials could open new windows of use in the area of sensing biomaterials or even amyloidosis inhibition.

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