

Nanocomposite hydrogels with applications in biomedical and chemical defense domain

ABSTRACT

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Hydrogels represent an innovative material with unique properties suitable for medicine and pharmacy, cosmetic, agricultural and electronic fields or decontamination applications. Nanocomposite hydrogels contain a reinforcing agent dispersed in the polymeric matrix and can exhibit both enhanced and controllable mechanical properties, characterized by wider spectrum of applicability.

The present thesis describes the development of new types of nanocomposite hydrogels reinforced with different agents: Laponite XLG, hydrophilic bentonite, TiO₂/ZnO nanoparticles and carbon nanofibers.

The primary objectives were to design and characterize the new types of hydrogels, studying the influence of the reinforcing agent on the structural particularities and mechanical properties for all categories of nanocomposite hydrogels presented, as well as classification by areas of applicability in accordance with the specific potential of each material obtained.

The *N*-vinyl-2-pyrrolidone monomer was the first candidate used to obtain the hydrogels described in this work, especially due to its versatile and unique properties associated with countless possibilities for use in drug delivery systems.

The hydrogels developed thru this thesis can serve as innovative “platforms” for applications such as wound dressings, drug delivery systems or different decontamination scenarios.