Starch based 'click' cross-linked conductive nanocomposite hydrogels

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In this work, a friendly strategy was proposed to obtain starch based conductive hydrogels. Cross-linked hydrogels were obtained by aqueous Diels-Alder (DA) reaction of furan-modified starch and a bismaleimide. Graphene was incorporated as conductive nanofiller using natural surfactants to improve its stability in water.

Firstly, starch was functionalized with furan moieties by the reaction of gelatinized starch with furfuryl isocyanate. Then, hydrogels were obtained through DA reaction using a water soluble bismaleimide [1]. The influence of using different Fu:Mal weight ratios was investigated.

The effectiveness of the DA reaction to form the hydrogels was studied by FTIR and UV-spectroscopy. Besides, it was founded that the use of different Fu:Mal weight ratios resulted in differences in the rheological behaviour, morphology and swelling capacity of the hydrogels. The highest Fu:Mal weight ratio was selected for the nanocomposite hydrogels since it showed the highest storage modulus and interesting interconnected porous structure.

Hence, conductive nanocomposite hydrogels were carried out by adding graphene [2] as nanofiller previously dispersed in water using surfactants from natural sources.

Upon the addition of graphene the hydrogel showed improved viscoelastic behaviour and presented antimicrobial activity against *E. coli* and *S. aureus*. Regarding to the electrical conductivity, it was significantly increased for the graphene containing sample.

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References

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Figures

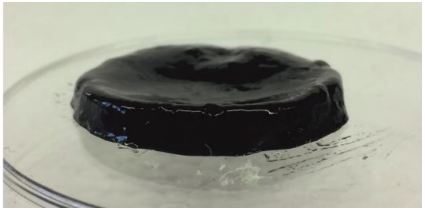

Figure 1: Obtained starch based conductive nanocomposite hydrogel.