New functionalized composites of nanocellulose and fibrous clays

CSIC has developed a method to combine at the nanoscale fibrillated cellulose (microcellulose and nanocellulose) with fibrous clays such as sepiolite and palygorskite, resulting homogeneous materials that can be subjected to different types of processing (films, foams, monoliths, etc.). The procedure performed in aqueous dispersion, allows easy incorporation of several additives, for example carbon nanotubes or magnetic nanoparticles that confer functionality on demand for these composite materials.

Companies for license and exploit the technology are sought

Nanocellulose, the material of the future

Nanocellulose is a material with a huge potential. It is transparent, light, resistant and can have multiple applications.

The developed methodology allows to achieve homogenous and stable materials resulting from the combination of two nano-fibrous materials, an organic component such as fibrillated cellulose (microcrystalline cellulose or microcellulose, nanocellulose from plant or bacterial origin) and other, fibrous inorganic component such as sepiolite and palygorskite clay minerals. They are directly generated as aqueous highly viscous hydrogels due to interaction between the surface hydroxyl groups of the two fiber components. The materials formed can be advantageously combined with various additives during the preparation, obtaining thereby nanocomposites provided with predetermined properties such as electrical conductivity, magnetism, etc.

It is the first time that nanocomposites made with nanocellulose defibrated, fibrous clays and carbon nanotubes are produced as a stable gel that can be transformed into solid phase.

These nanocomposites can be used as adsorbent, thickening agent, feed additive, catalyst support, enzyme carrier, flame retardant and self-extinguishing material, cement additives, food packaging and special papers (nanopaper).

Main features and advantages

- Safe and environmentally friendly preparation method by applying simple physical process that doesn’t require the use of chemicals.
- Capacity of functionalization during the formation of the composite material
- Generation of very stable viscous gels that can be subsequently subjected to various types of processing: films, foams or monoliths
- Materials applicable to a variety of areas based on their textural properties, mechanical properties, biocompatibility and possibility of multifunctionalization.

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Patent application filed.

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