

NEW ORGANOGELATORS THAT REMAIN STABLE AT HIGH TEMPERATURES

DESCRIPTION OF THE INVENTION

Researchers from Universitat Jaume I de Castelló have developed and patented several new organogelators with a low molecular weight that are capable of producing gelation in a wide range of organic solvents. The gels formed are also capable of remaining stable at high temperatures. The invention is of great use in the cosmetics and the pharmaceutical and foodstuffs industries, since in all three cases it is important to maintain the stability of the gels when the products that contain them are submitted to relatively high-temperature conditions.

The gelation technique consists in entrapping the solvent in a fibrillar network formed by organic molecules that interact with each other. The mechanism by which gels are formed consists in dissolving these organic molecules in a solvent. This solution is known as the sol phase. The resulting solution is heated to a certain temperature and then left to cool. This gives rise to a gel, which is called an organogel when the entrapped solvents are of an organic nature and a hydrogel when the solvent is water.

In the invention developed here, the formation of the fibrillar network in the gel is produced by means of a highly organised process of self-assembly, which makes it possible to obtain very hierarchically organized structures with a much greater potential

for producing high added value applications. To achieve high thermal stability of the gel, the forces of interaction among the organic molecules that act as organogelators must be strong. These intermolecular interactions can be achieved by combining multiple complementary hydrogen bonds, providing an overall interaction energy that is very high. In the case considered here, the gels that are formed are stable at temperatures close to 100 °C and sometimes remain intact even at the boiling point of the solvent.

One advantage of these organogelators is that they are quick and easy to synthesise, with a high final performance and easy scaling. Finally, their gelling action takes place with the addition of very small amounts to the corresponding solvent.

The structures considered here were prepared from amino acids and can be described as pseudopeptides, which increases the range of their potential applications since it facilitates their biocompatibility.

SECTORS FOR COMMERCIAL APPLICATION

The industrial areas in which this technology can be applied include foodstuffs, pharmaceuticals, cosmetics, biomedical, biochemistry and clinical medicine, or sectors related with the preparation of intelligent materials and materials that can be applied in analytical processes or in the preparation of electronic devices.

In the pharmaceutical and cosmetics industries gels are widely employed in the development of different commercial presentations and these organogelators could increase the stability of such preparations due to the fact that they are not affected to any significant extent by changes in temperature.

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TECHNICAL ADVANTAGES AND COMMERCIAL BENEFITS

The main advantages of the technology are:

- Wide variety of organic solvents for those that act as organogelators.
- Stability of the gels formed under high-temperature conditions, which thus increases the number of possible scientific and industrial applications.
- Easy, simple, scalable and low-cost synthesis. Organogelators are synthesised from the corresponding pseudopeptide with a single-step reaction and very high performance, which makes the purification stage easier.
- A pseudopeptide nature that enhances biocompatibility, since the use of amino acids in the chemical structure of the organogelators makes them more similar to natural peptides.
- Gelling action at low concentrations. The use of amounts below 1% is essential for the gel-forming process to be economically viable.

Most organogelators described in the literature to date are structurally complex and involve long synthetic procedures with low overall performance, which thus makes it more difficult to apply them on an industrial scale. Moreover, these organogelators usually have a low thermal stability, which makes it difficult to use them in some industrial applications. Furthermore, most of the organogelators reported to date are only capable of acting as such in a very narrow range of solvents. Currently there is a lack of known structures that can form gels in a sufficiently large number of solvents.

In view of this situation, the main innovative features of the technology proposed here are, first, that it makes possible to create a family of organogelators that are capable of generating gels with a high degree of thermal stability. Second, it allows for the creation of a family of organogelators that are capable of generating gels for a wide range of solvents.

STAGE OF DEVELOPMENT OF THE TECHNOLOGY

The laboratory phase for the synthesis and characterisation of these compounds has finished and the research group is involved in a project for the proof of concept of the technology. Industrial partners are currently being sought to transfer the molecules so that they can be exploited commercially or with whom applications can be researched and developed. Given the simplicity of the synthesis of the products and, above all, the extremely small amount needed for their application, production could be achieved in a very short period of time by any enterprise already working in the field of gelling agents.

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INDUSTRIAL PROPERTY RIGHTS

A Spanish patent has been applied for with the reference P201131333 and filing date 07/29/2011. In process of internationalization by PCT.

COLLABORATION SOUGHT

- License agreement for use, manufacturing or commercial exploitation.
- R&D for further development of the invention or for exploring its applications in other industrial sectors.

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