

Aqueous ferrofluids with improved magnetic heating for hyperthermia

CSIC has developed aqueous ferrofluids where magnetic nanoparticles are dispersed in water using a biopolymer as a dispersing agent. These ferrofluids are obtained following a one-step method which gives rise to stable colloidal suspensions for periods up to 6 months at physiological pH. In addition, these ferrofluids exhibit enhanced heating effect during the application of a magnetic field, which makes them suitable for biomedical applications, such as hyperthermia therapy.

Industrial partners in the pharmaceutical, biomedical or chemical sector interested in the patent license for the development and commercialization of applications are sought.

An offer for Patent Licensing

Suitable for intravenous administration

Ferrofluids hold great potential for application in biomedicine. Most methods to produce ferrofluids involve more than one-step and give rise to dispersions with short-term colloidal stability. When using biopolymers as dispersing agents, an additional difficulty is encountered since there are no standardized methods for determining their molecular weight. This fact prevents a true control and reproducibility of the production method due to the great variability of the starting biopolymers.

Ferrofluids developed by CSIC consist of a colloidal dispersion of iron nanoparticles in water using sodium alginate as dispersing agent. Synthesis and stabilization of these nanoparticles are achieved through a one-step method in mild conditions. The high specific power absorption (SPA) of these ferrofluids allows magnetic heating of 17°C in just 90 s under an applied magnetic field of 300G and 440kHz. Besides, due to their improved stability at physiologic pH and their small particle size (~8 nm), these ferrofluids are suitable for intravenous administration.



Ferrofluids exhibit high SPA rates enabling to raise temperature above 42°C in short times.

Main innovations and advantages

- Synthesis and stabilization of nanoparticles is carried out in a one-step method in mild conditions.
- Their high SPA rates allow rapid magnetic heating.
- Their small particle size together with their long-term colloidal stability and the presence of a biopolymer as a dispersing agent, inherently biocompatible and biodegradable, enable the intravenous administration of these ferrofluids.
- These ferrofluids are suitable for hyperthermia therapy.

Patent Status

Priority patent application filed suitable for international extension

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