Technology offer

Innovative method for preparation of functionalized superparamagnetic adsorbents with precursor trimethoxy (3,3,3-trifluoropropyl) silane (F-TriMOS)

Field of use

Water pollution, nanoparticels, superparamagnetism, adsorbent, oils.

Current state of technology

Stage of Development:
Available for demonstration

Patent status

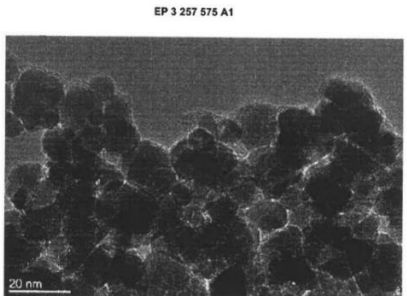
Patent pending

Developed by

University of Maribor

Contact details

University of Maribor
Knowledge and technology transfer office
Telefon: +386 2 23 55 298
E-mail: tto@um.si



Background

Classical methods of cleaning oil spills do not give satisfactory results in removing the oil from the water, but functionalized nanomaterials show high potential to become a cost-effective, efficient, and environmentally friendly solution. Among the existing methods of cleaning oil stains from water, the use of various adsorptive materials, such as silicon dioxide, titanium dioxide, zinc oxide and aluminum oxide are present. These materials are non-biodegradable and represent a high risk of secondary pollution. The invention of researchers at the University of Maribor is based on the problem of how to synthesize nanoparticles so that they will have physicochemical properties that will be useful for adsorption of oil stains and spills in water.

Description of the invention

The main object of the invention is how to prepare superparamagnetic iron oxide ($CoFe_2O_4$) nanoparticles surface-functionalized with trimethoxy (3,3,3-trifluoropropyl) silane (F-TriMOS), the functionality of which allows the adsorption of oil stains from water with an adsorption capacity of the range of 2.0 – 4.0 g oil/g adsorbent, wherein a superparamagnetic core based on $CoFe_2O_4$ iron oxide with a spinel crystal structure, permits responsiveness and conductivity of the entire adsorption nanostructure under the influence of an external magnetic field, regeneration and reuse of the adsorbent.

Main advantages

An advantage of the invention is in the preparation of endogenous, superparamagnetic iron oxide nanoparticles. Superparamagnetic properties allow nanoparticles to respond to an external magnetic field but not to be permanently magnetized. Therefore, such nanoparticles can be removed from the medium after adsorption by an external magnetic field, regenerated and reused in the next adsorption cycle without losing their functional properties.

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