Ensuring the safety of nano-particles in paints and coatings

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Credit: AI-generated image (disclaimer)

There has been an explosion in the number of nano-based products in recent years. Research in this field has attracted a great deal of scientific interest, due in part to the wide variety of potential applications in the biomedical, electronic and coating fields.

This is a development that presents both opportunities and challenges. While the manipulation of materials and particles at the atomic and molecular scale has opened the door to potential new innovations, it has also raised some serious health and safety concerns.

One such concern is over the health effects of breathable nanoparticles, which can be found in a number of end products such as paints. There are also fears that the discharge of some of these nanoparticles into rivers and streams could be damaging the gill membrane of fish and crustaceans.

The EU-funded NANOFLOC (Electro-agglomeration and separation of Engineered NanoParticles from process and waste water in the coating industry to minimise health and environmental risks) project was established in January 2013 to address this very concern. It aims to develop a system capable of removing nanoparticles in an efficient and cost-effective manner, in order to prevent pollution and encourage the further development of innovative and safe nano-based products.

The NANOFLOC innovation is based on novel electro agglomeration, which the team believes can effectively remove suspended solids to sub-micrometre levels. The system works by destabilising nano suspensions and agglomerations of charged particles in solutions using electric fields, thus avoiding the need for chemicals.

The technology is cost effective, compact and environmentally friendly. An innovative reactor for the agglomeration and stabilisation of these agglomerations - or flocs - will be built, along with a reaction chamber and an intelligent process control system (PCU).

The project, which will receive EUR 1 141 968 in EU funding through the FP7 'Research for the benefit of SMEs' scheme, could prove highly environmentally - and economically - significant. Currently, the only

effective means of removing nanoparticles from water is through the application of energy intensive methods such as reverse osmosis, a water purification technology that uses a semipermeable membrane.

Industries that extensively use nanoparticles - such as the paint and coating sector - stand to considerably benefit from a cost effective technology for removing nanoparticles from used water. The use of nanotechnology in this sector is expected to grow exponentially: by 2016, vehicle manufacturers will be required by law to use anti-scratch paints and coats on their vehicles.

Project results so far have shown promise with regards to electro coagulation technology in paint. A recent project meeting in Stuttgart looked at titanium dioxide and aluminium flakes, and also viewed a potential electro-coagulation reaction chamber.

More information: www.nanofloc.org/

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