NANOFLOC project

The project officially started on January 1st, 2013 and has a duration of 24 months. NANOFLOC has received funding from the European Unions's 7th Framework program managed by REA – Research and Executive Agency (http://ec.europa.eu/research /rea (FP7/2007-2013)) under grant agreement no 315195. You can follow the project progress at www.nanofloc.org.

Project Beneficiaries

Westmatic: Supplier of bus, truck and train wash equipment, including water treatment of industrial waste water by use of EC. SME Coordinator (Sweden)

ASIO, Ltd: Supplier of technologies for water and wastewater treatment, SME Participant (Czech Republic)

BAMO mesures: Supplier of instruments for the measurement and monitoring of liquids, SME Participant (France)

Melotec Kunststoffverarbeitungs GmbH: Expert in plastic processing, SME Participant (Germany)

Teknologisk Institutt AS: RTD Performer (Norway)

Fraunhofer IGB: RTD Performer (Germany)

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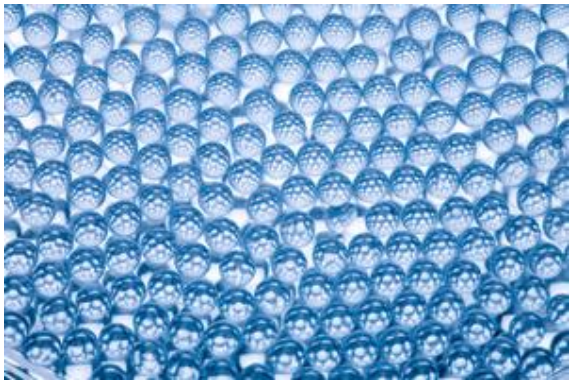
NANOFLOC

Electro-agglomeration and separation of Engineered NanoParticles from process and waste water in the coating industry to minimise health and environmental risks



NANOFLOC Project description

The NANOFLOC project will develop a novel and cost effective system for removal of Engineered Nano-particles from water used in surface coating. The technology will be based on electrocoagulation process.

Functional engineered Nano-particles (ENPs) have several advantages and their use is rapidly growing. However, there are serious potential Health & Safety hazards linked to these substances as well as potential adverse environmental impacts. Therefore there is a need for innovative technologies which can remove ENPs from wastewaters. Our NANOFLOC project will do just that.

The **NANOFLOC** technology is based on destabilisation of Nano-suspensions and agglomeration of charged Nano-particles in solutions using electric fields and flocculation in one step. The idea is to develop a reliable, flexible and competitive unit that enables agglomeration of nano-particles in water to ensure efficient separation from the liquid phase.

The advantages of of using electro coagulation process for removal of ENPs:

- no addition of chemicals
- the amount of coagulant created by the process can easily be controlled by varying the electrical current applied
- the production of a soft turbulence that promotes the flocculation process (generation of gas bubbles)
- the easy automation of the process

NANOFLOC Project results

Expected project results:

The project output will be a prototype of an electroflocculation reactor equipped with a sacrificial and inert electrodes.

Processes performed in reactor:

- **Destabilisation** of nano-particles in solution
- **Agglomeration** of destabilized nanoparticles
- **Stabilization** of agglomerated particles
- **Separation** of agglomerated nanoparticles

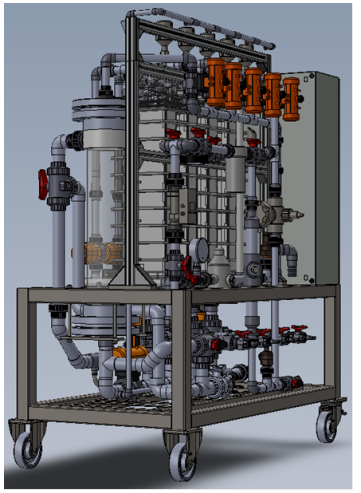
The described sequence of reactions taking place in the **NANOFLOC** concept, are all performed in one reactor simultaneously.

NANOFLOC Project progress

Work done to date:

- Detailed characterisation of agglomeration processes and the impact of electric field on the surface charge of ENPs
- Characterisation of flocculation parameters relevant to process kinetics
- Development of an electric field configuration to achieve a homogeneous field
- Modelling of the electrolytic process and validation of functionality on agglomeration
- Selection of electrode materials
- Design of reactor configuration and hydraulic properties
- Laborotory modelling of ENP agglomeration
- Validation of the laboratory scale reactor prototype combined with separation process with more than 95% efficiency.

Based on results of the laboratory tests a pilot unit has been designed and built and is currently under functionality tests at Fraunhofer.



Electrolysis and separation system of the pilot plant