EDS Webinar
October 28, 2021, 16:30 – 18:30 CET

NewSkin: Industrial uptake of nanotechnologies

PROGRAM

Ursula Annunziata (European Desalination Society) - Greetings

Carlos del Castillo (European Convention for Constructional Steelwork)

David Kinahan (Dublin City University)

Lorenzo Bautista (Leitat Technological Center)

Viatcheslav Freger (Technion – Israel Institute of Technology)

NewSkin is an Open Innovation Test Bed that will bring into reach of the water treatment industry a set of upscaling and testing facilities as well as route to market services to accelerate the uptake of nano-enabled surfaces and membranes in the water treatment industry. Upscaling facilities include: the continuous production of mono-atomic graphene membranes, nanopore creation on monoatomic graphene, ceramic and polymeric membranes, carbon nano-tube technology and other nanoparticles coated membranes, laser and thermal imprinted nano-textures for enhanced fouling resistance, continuous vacuum processes for TiO2 and other functions and textured and coated component for improved performance of water treatment equipment.

NewSkin will coordinate the actions of 21 research and technology organizations and industries to offer services accessible through a single-entry point under fair pricing conditions. The first of four open calls for free services will be available from October 2021.

SPEAKER INFORMATION

Carlos del Castillo (European Convention for Constructional Steelwork)

Bio
Carlos del Castillo is a Chemical Engineer and MSc in Sustainability and Project Management. With 18 years of experience in Innovation Projects management and execution, he plays the role of Project Manager in the ECCS. He is the NewSkin Open Innovation Test Bed Project Manager, responsible for the project follow-up and the coordination of partners interactions, technical and route to market activities.

Presentation
NewSkin: Innovation ecosystem to accelerate the industrial uptake of advanced surface nanotechnologies

Abstract
NewSkin Project overview

David Kinahan (Dublin City University)
Upscaling large-area machining of complex structures through multi-modal laser processing

Bio
David Kinahan is an Assistant Professor in the School of Mechanical and Manufacturing Engineering and is a principle investigator in the DCU Water institute and I-Form Advanced Manufacturing Centre. He completed a BEng in Aeronautical Engineering (2003) at University of Limerick and a PhD in 2008 focusing on high-throughput droplet microfluidics for DNA analysis. In 2007 David joined Stokes Bio Ltd, a spin-out from University of Limerick Stokes Institute, as Senior Engineer, and later Engineering Manager. In January 2012 David joined DCU and has applied microfluidics to a wide range of application areas including human health (HIV diagnostics, CTC detection, CVD diagnostics, liver disease, early detection of bacterial meningitis) and point-of-use (plant pathogen detection, environmental monitoring).

Presentation
Upscaling large-area machining of complex structures through multi-modal laser processing

Abstract
Laser material processing offers a unique and scalable approach to develop functional surfaces with highly defined surface geometries, pore sizes or surface functionalities. Laser structuring of surfaces can increase the antifouling properties of conventional materials, especially in marine applications. Similarly, laser thermal hardening can be utilised to increase corrosion or wear resistance, extending the lifetime of water-facing motion components. While these are traditionally approached as separate processes, a multi-modal approach combining multiple laser sources would allow for rapid and scalable manufacturing of these functional surfaces.
Within the NewSkin project, we have developed a multi-modal processing system combining ultra-fast laser machining (for surface structuring or pore-drilling) with laser thermal hardening (for increased wear and corrosion resistance). These two processes can be operated independently, or combined into a single-step process for the production of functional surfaces with applications in water filtration and treatment, anti-fouling and water facing motion components.

Lorenzo Bautista (Leitat Technological Center)

Bio

Dr. Lorenzo Bautista has a PhD in Chemical Engineering at the Polytechnic University of Catalonia (UPC) and a Chemical Engineering degree by the University of Barcelona (UB). He holds also a Postgraduate in Paint Technologies by Institut Químic de Sarrià (IQS). He has taken part in different research projects, published in different scientific journals, and presented results in international congresses. At present, Lorenzo Bautista works in as Surface Chemistry Area Manager in the Applied Chemistry and Materials Department of LEITAT. He coordinates R&D projects related to coatings and surface treatments of materials. He has specialized in surface preparation and functionalization of multimaterials by low-pressure and atmospheric pressure plasma technologies; chemical and plasma-induced superficial grafting processes; PECVD technology; formulation of inks, paints, coatings and adhesives; microencapsulation; surface cleaners; lubricants; conversion coatings; coating, finishing and printing technologies; surface disinfection technologies and surface analysis.

Presentation

Surface treatment of membranes by plasma technology. The NewSkin approach

Abstract

A lot of research and development effort on plasma technology applied to porous substrates such as membranes has been done since the early 1980s. However, some aspects hamper its effective scaling-up for industrialization. Some of these obstacles are intrinsically connected to the technology itself (i.e. possible effects of ageing, superficial properties conferred), some other are connected to the development of the technology (i.e. low-pressure and atmospheric pressure plasma systems, capability and throughput of the processes), or to the nature of membrane structures (i.e. flow of plasma fluids). Some studies about plasma treatments on membranes to confer hydrophilic, hydrophobic, antimicrobial, antifouling, and other functional properties have recently been published.

The effect of several process parameters such as the type of plasma gases, flowrate, residence time, power of discharge and temperature, among others, have been investigated. In this context, atmospheric pressure glow discharge (APGD) emerges as an innovative and sustainable technology to modify the surface of membranes without modifying their intrinsic

properties, with very few consumption of chemicals and energy, and no generation of wastewaters and residues.

The NewSkin project consist of creating an innovation ecosystem to accelerate the industrial uptake of advanced surface nanotechnologies. Our value proposition is focused on surface modification of membranes by APGD and functional finishing processes. The NewSkin Open Innovation test Bed (OITB) upscaling facility for this value proposition include APGD technology for surface preparation and modification of membranes together with their possible combination with functional finishing technology. Different applications onto graphene sheets, several types of membranes, and other substrates such as textiles or paper materials for water treatment, food industry, technical textiles, and/or printed paper will be implemented within the project. The main applications focused on modification of nano-roughness, surface activation/preparation and surface modification/functionalization are presented in our work**.**

Viatcheslav Freger (Technion – Israel Institute of Technology)

Bio

Viatcheslav Freger is a Professor at Wolfson Department of Chemical Engineering of Technion – Israel Institute of Technology in Haifa, Israel. He completed M.Sc. in chemical engineering at Mendeleyev Institute of Chemical Technology, Moscow (1988), and a Ph.D. at Ben-Gurion University, Israel (1999). In He was a Postdoctoral Fellow at the University of Bath, UK (1999-2000), a faculty at the Ben-Gurion University (2000-2011), and a visiting scientist at UC Berkeley and UC Davis (2009-2010). Professor Freger's main interests are in the areas of membrane technology for water and energy sectors, desalination, and water treatment, as well as polymers, surface science, electrochemistry, and advanced materials. He has extensively published and given invited talks on international meetings on various aspects of membrane transport theory and mechanisms, advanced characterization methods, use of advanced materials and processes in membrane separations, and fouling and biofouling phenomena. He has authored ~100 scientific papers and chapters, as well as several patents, and collaborated with industrial companies in Israel, USA and Germany.

Presentation

Surface modification of desalination membranes for improved performance

Abstract

Surface treatment in the form of coating is an attractive way of tuning performance of desalination membranes or membrane elements post-manufacturing or in situ. Focusing on surface modification via polymer grafting, the talk will consider two key aspects, fouling and biofouling resistance and improved selectivity towards various permeants, and present our recent insights and rationales for selecting appropriate coating.