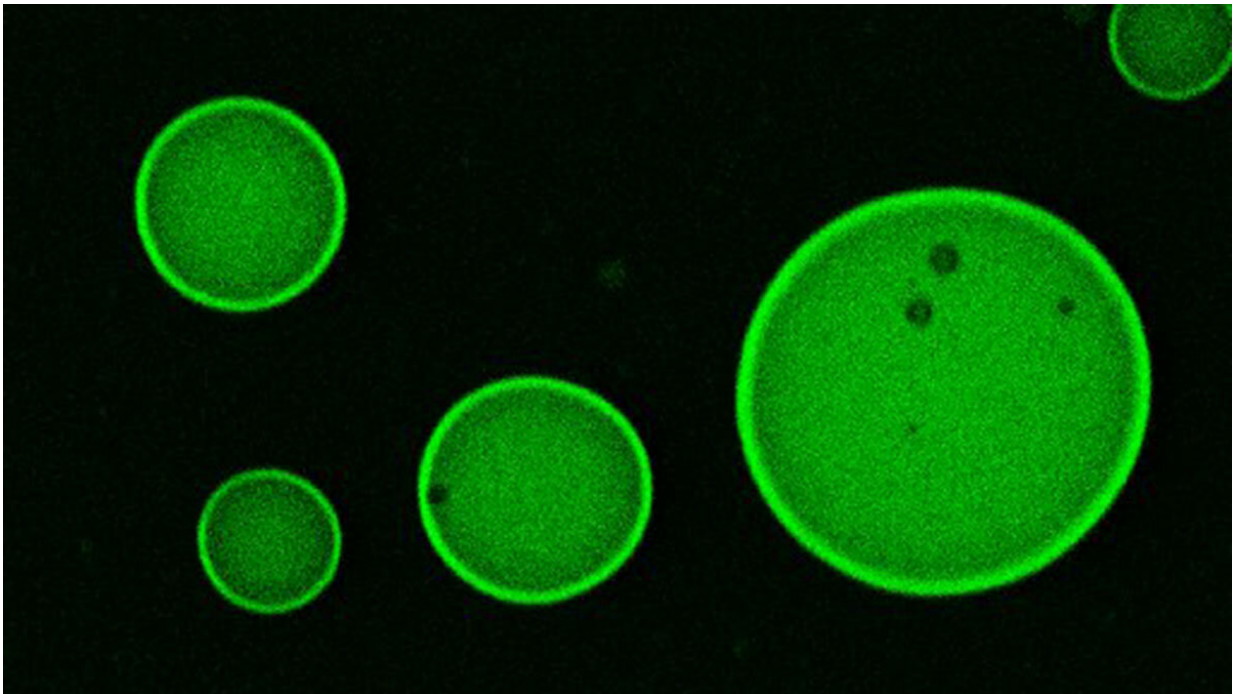


Marine alternatives for petrochemicals in everyday items

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An international team of scientists, coordinated by Professor Stephen Euston at Heriot-Watt University, has been tackling sustainability issues in everyday items like foods, pharmaceuticals, and beauty products. They have been using natural ingredients produced by marine microbes as alternatives to the chemical agents currently used. Credit: Heriot-Watt University

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The huge market demand for surfactants and emulsifiers is currently met with synthetic, mainly petroleum-based chemical products. These are commonly non-biodegradable and can be toxic. Surfactants are used to reduce surface tension, as in detergents, dispersants, and foaming agents, whereas emulsifiers can be added to stabilize oil in processed foods or cosmetic creams.

Led by demand from industry manufacturers keen to find more [sustainable sources](#), the MARISURF Consortium, funded by Horizon2020 and led by Heriot-Watt University, has unveiled promising alternatives found in marine microorganisms.

Dr. Tony Gutierrez from Heriot-Watt University provided the large bacterial collection used for the screening and discovery of novel surfactants and emulsifiers. He said: "The MARISURF project was designed to improve the sustainability and quality of a wide range of consumer products by using [natural ingredients](#) produced by marine microbes. We developed innovative approaches to discover, characterize and produce novel marine-derived biosurfactants and bioemulsifiers.

"A lot of attention in the project has focused on testing the ability of the bacterial [strains](#) to produce different types of surfactants and emulsifiers. We identified several strains which showed highly promising qualities of relevance to specific industries, in particular for potential use in foods, healthcare products and pharmaceuticals.

"From 500 initial strains, the research team worked closely with industry partners to scale up production of two strains with very positive feedback from the end users on functionality. This indicates there is

clear potential for these strains to be useful in commercial applications. However, investment will be required to ensure the cost efficacy of production.

"In the future, this could have huge potential impact for industry and for consumers themselves as these strains are derived from a sustainable and non-pathogenic marine bacterial source. They are of biogenic origin so have a much better environmental profile compared to petroleum-based surfactants which are currently used in industrial applications."

Despite the widespread media exposure about the environmental impact of ingredients like Palm Oil, the cheap ingredient remains central to many foodstuffs. If production could be scaled, the MARISURF team hope their research could help replace it with marine-based material in the future. However, cost remains the central challenge necessitating further research.

The MARISURF project collaborated with industry throughout to ensure the academic research met end user requirements and provided desirable characteristics for the new surfactants.

Professor Stephen Euston continued: "The applications for this research are widespread. For example, there is potential for maritime sources to provide an appropriate replacement for Palm Oil as an emulsifier. However, ensuring this is commercially viable for the [food](#) industry will be the most challenging next step. Consumers won't spend a high premium on everyday food items and that has to be factored into the race to address sustainability.

"The research has the potential to positively impact the food industry. We are working with Marlow foods to help them remove egg whites from their range, thus opening up more of their product range to those following a Vegan diet. The current egg white replacements on the

market are not suitable for all products. Our new strain isn't affected by some of the issues encountered with other protein sources and is suitable for Vegans as it is not animal derived.

"Working so closely with industry and our collaborative universities allowed the Consortium to develop promising naturally derived surfactants from discovery, through to proof of concept, industrial production and application in product formulations by the commercial end users. This approach to research is both exciting and novel. This template for collaboration is already leading to further opportunities to integrate industrial and academic research."

Provided by Heriot-Watt University

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