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Surfactants

Seattle, Washington-based Sironix Renewables announced last month the closing of an over-subscribed seed funding round of \$645,000, the company's first financing round, that included funding from the University of Minnesota Discovery Capital Investment program and from angel investors. Additionally, Sironix also has been awarded a \$1.15 million grant from the US Department of Energy Advanced Manufacturing Office. Sironix said it will use the new funding to scale up production of its 100% bio-based Eosix® oleofuran surfactant technology which combines furans with fatty acids.

Sironix was founded in 2016 as a spin-off from the University of Minnesota which patented the technology of producing oleofurans via a chemocatalytic process using zeolite catalyst. Sironix is looking to compete its Eosix® surfactant with the incumbents, sodium lauryl sulfate (SLS), an anionic surfactant found in many personal care products; sodium lauryl ether sulfate (SLES), an anionic surfactant used in cleaning and personal care products; and linear alkylbenzene sulfonate (LAS), an anionic surfactant used in laundry detergents and other cleaning products. The company's renewable oleofuran sulfonate surfactants reportedly has improved detergency properties, reducing production energy intensity of surfactant production by 30% and consumer energy use for laundry applications by as much as 50%.

Oleofuran surfactants also reportedly eliminate the hard water problem by using a naturally-derived source that does not bind strongly to minerals in water. In addition to biodegradability and cleaning performance, Eosix® reportedly has the foam consistency of conventional detergents which means it could directly replace surfactants that are used in existing equipment such as washing machines, dishwashers and consumer products. Eosix® is said to be stable in pure solid form and therefore has the cost advantage in terms of transportation costs as well as eliminating the need for additives and other agents such as EDTA, a hard water booster. It also performs well in cold water temperature and most importantly, it can provide an alternative to sulfated and ethoxylated surfactants that can create 1,4 dioxane as a by-product, a likely carcinogen that is currently being regulated in the states of New York and California.

Sironix's production of Eosix® is still at bench scale but the company is looking to scale up manufacturing through partnerships. Sironix said it can easily source both furan and fatty acid feedstock, which are commercially available. The company's technology can also be incorporated in existing surfactant

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manufacturing processes which is why the company does not intend to be a dedicated manufacturer and instead will rely on partnerships. Sironix claims to be the only company so far who has been actively developing a commercial market for oleofuranic surfactants as cleaning ingredients. By 2021, the company is looking to scale production via contract manufacturing to supply first customers in the eco-friendly cleaning and personal care markets.

A techno-economic analysis presented by the company in January noted that for a 50,000 tpa plant, its Eosix® surfactant in an optimised process could achieve manufacturing costs of around \$1.95/kg and an ROI (return on investment) of 22% with a payback period after four years. Capital investment for such plant can cost around \$20.1 million.

