Nanoinnovation Abstract

Title: Upscaling and adoption of bio-based closed-loop chemically recyclable epoxy composites

Abstract: The application of composite materials is paramount in enabling a more sustainable world through their ability to reduce weight and emissions. In transportation, composites can improve efficiency and reduce energy consumption facilitating efficient electrification. In renewables they enable the fabrication of lighter, larger and more efficient structures for energy generation. To progress this further, there is opportunity to reduce reliance on oil-based feedstocks through leveraging bio-based chemistry lowering the environmental impact of producing composite structures. Moreover, at end of life, environmental, technical and economic challenges exist around viable recycling of composite materials. Their long service life cycles make forecasting future supply and controlling quality of materials to be recycled increasingly challenging compared to for example, short lifecycle single use plastics. This is compounded with the need for more flexible recycling output options to ensure sufficient retained future value exists.

This contribution will share the approaches Gurit has taken to create high bio-carbon content composite resin systems, navigate challenges with a unified life cycle analysis approach to ensure data-driven solutions are developed. Key challenges and approaches adopted with upscaling chemically recyclable close loop circular solutions through Gurit's involvement in the "Repoxyble" project will be discussed. Underpinning how a holistic approach is required leveraging collaboration throughout the entire composites supply chain to change how we design, use and recycle to enable next generation composite materials to be realised.