An automated, high-throughput platform for gene assembly, amplification, transformation, strain growth, and metabolite analysis enables the production of bio-based monomers and polymers with precise repeat units, domains and chirality directly from microorganisms. By providing an equipment set focused on automation, control, and high-throughput pathway assembly at the gene level and metabolite detection at the cellular level, the Living Bioreactor will enable biosynthetic manufacturing of commodity monomers and polymers.

A ThermoFisher Laboratory Automation System (LAS) serves as the cornerstone technology for the facility, enabling execution of automated customized synthetic biology and workflows at >500 samples-per-week. The LAS is equipped with over of over 10 functional instrumental components, including: a state-of-the-art SpinnakerTM microplate robot, automated incubators, reagent dispensers, thermal cyclers, plate sealer, and carousels/racks that are seamlessly integrated through the MOMENTUMTM application programming interface that is fully-compatible with laboratory information management systems (LIMS).

The Spinnaker robot is a SCARA 4-axis microplate mover that is functional through the full 360-degree LAS workspace. The robotic arm uniquely provides: an integrated vision system and barcode reader to enable real time sample tracking and inventory management as well as a gripper equipped with plate detection and adjustable gripping force to eliminate labware handling errors and reduce sample loss.

The proprietary Momentum API offers the ability to build scientific workflows through intuitive graphical interfaces using scheduling algorithms and dynamic process logic for optimal performance. Momentum includes inventory controls which allow for greater flexibility and exceptional sample and inventory management. The system is compatible with over 325 automation friendly instruments and movers with a driver deployment model that enables the owner to modify the system components easily and at zero or minimal cost.

The capabilities of the Living Biofoundry Facility are supplemented by: (1) a Thermo Fisher TSQ Altis inline triple quadrupole mass spectrometer coupled with an ultra-high-performance liquid chromatograph (UHPLC/MS/MS) for separation and analysis of synthesized bio-derived monomers, (2) Agilent Technologies 7890A gas chromatography system, and (3) BIOFLO CELLIGEN 310 fermenter/bioreactor for scale-up microbial culture.