

# A USER FACILITY DEDICATED TO BIOMATERIALS







DMR-1933487

**BIOPACIFIC MIP RESOURCES ARE FREE  
OF CHARGE TO U.S. BASED USERS  
WITH APPROVED PROPOSALS**

For more information please  
visit the BioPACIFIC MIP website:

[biopacificmip.org](http://biopacificmip.org)



-  Additive Manufacturing
-  Automated Materials Synthesis
-  High Throughput Characterization
-  Living Biofoundry

# PROPOSAL SUBMISSION

The NSF BioPACIFIC MIP operates a one of a kind user facility dedicated to creating a nexus for synthetic biology and materials to revolutionize high-performance polymers. Users are uniquely able to elucidate biomaterial structure and function to achieve materials-by-design, construct new bio-derived functional monomers from living organisms, access novel sequence-specific materials (e.g. peptoids), synthesize stimuli-responsive “smart” biomaterials, scale-up biomaterial production, and incorporate state-of-the-art theoretic simulation and machine learning algorithms. Submit a proposal and gain free access to our facilities!



# LIVING BIOFOUNDRY

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 Biofoundry will enable biosynthetic manufacturing of commodity monomers and polymers.

## THERMOFISHER SYNTHETIC BIOLOGY AUTOMATION SYSTEM

- ✓ Integrated, automated workflow
- ✓ Accelerates the DBTL cycle from 10s of samples-per-week to >500 samples-per-week
- ✓ Microplate robot
- ✓ Automated incubators
- ✓ Reagent dispenser
- ✓ Automated liquid handling
- ✓ Plate labeler/reader
- ✓ Thermal cycler
- ✓ Plate sealer



## THERMOFISHER TSQ ALTIS INLINE TRIPLE QUADRUPOLE UHPLC/MS/MS

5-2000 m/z mass range w/ Active Ion Mgmt



6 channel high-pressure solvent blending





# AUTOMATED SYNTHESIS

## GYROS PROTEIN TECHNOLOGIES SYMPHONY X SOLID PHASE SYNTHESIZER

- ✓ Employs 40 unique monomers and 24 reaction vessels
- ✓ Automatic cleavage and reagent recovery
- ✓ Scale up to 2 grams of resin per vessel



## SHIMADZU NEXERA REVERSE-PHASE ANALYTICAL/PREPARATIVE HPLC-MS

- ✓ Dual prep and analytical flow paths with dedicated UV-VIS and PDA detectors
- ✓ Inline mass spectrometry for both analytical and prep

## VAPOURTEC R-SERIES FLOW CHEMISTRY SYSTEM

- ✓ Column reactor, PFA reactor, High temp SS reactor, Cooled reactor
- ✓ Electro-chemical reactor, Photo-chemical reactor (365, 405, 450 nm LEDs)
- ✓ Inline Flow FTIR, Inline 60 MHz NMR



## CHEMSPEED AUTOMATED CHEMISTRY PLATFORM

- ✓ Automated library synthesis for ATRP, ROMP, RAFT, and photo-controlled polymerizations
- ✓ Parallel synthesis reactors for photo-, high-pressure, high and low-temp reactions

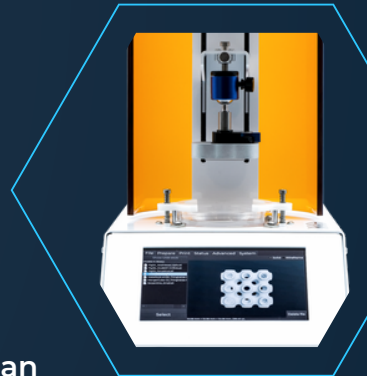


# ADDITIVE MANUFACTURING



## CELLINK LUMEN X SLA

- ✓ Prints living cells
- ✓ DLP printer leverages digital micromirror device (DMD) to offer users high resolution (50µm XY, 5µm z) prints.
- ✓ Prints with a 385 nm light source using an STL (stereolithography file)



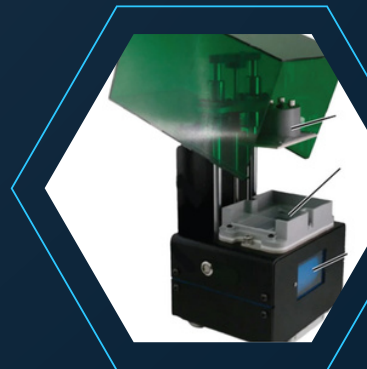
## CELLINK BIO X

Extrusion based 3D printer with different printheads giving users the flexibility to print hydrogels, thermoplastics, and bio inspired materials.



## MONO1 & MONO3 DLP PRINTERS

- ✓ Wavelengths: mono1: 405 nm  
mono3: 460, 525, 615 nm
- ✓ XY resolution: 20-45 µm  
Print speed: 420 µm/min



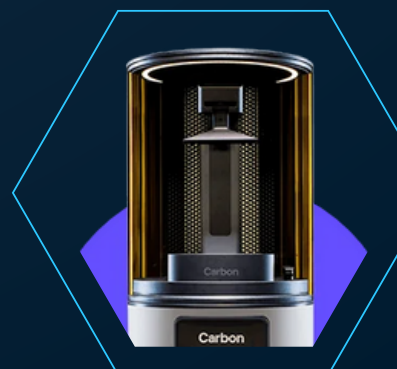
## SOLUTION MASK LIQUID LITHOGRAPHY (SMALL)

One-step multi-material 3D printing with visible light (480-700nm)



## CARBON M2 3D PRINTER

- ✓ Creating “layerless” components with smooth external surfaces and solid cross-sectional areas of printed features via continuous liquid interface production technology (CLIP).



# HIGH THROUGHPUT CHARACTERIZATION

## THERMOFISHER MICROED

- ✓ First-of-its-kind TFS Spectra 300C TEM Operating from 30kV to 300kV for microED & 4D STEM
- ✓ X-CFEG High Brightness Electron Source
- ✓ State-of-the-Art Single Tilt and Double Tilt Cryo-Transfer Holders plus Cryobox

## HIGH-THROUGHPUT MICRORHEOLOGY TOOL

Passive, high-throughput method for automated microrheology

Coupled with a software that increases throughput by 30X for data acquisition and 60X for analysis for microscale volumes of fluids and soft solids

## NEXT GENERATION X-RAY

- ✓ High-brilliance x-ray source and large area photon counting detector
- ✓ Impacts: >100% boost in measurement throughput with improved resolution
- ✓ ~10X increase in beam flux  
~4X increase in detector area

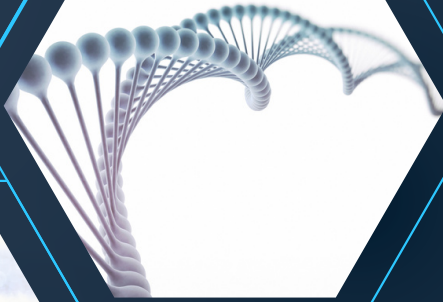
## TEXTURE TECHNOLOGIES TEXTURE ANALYZER

Mechanical testing capabilities for soft materials.

~1mN of force via a 50N load cell



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**APPLY NOW  
AND GAIN  
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