BONDI

Biomanufacture Natural Products on Demand

Specialty Chemicals

Challenge

Ever increasing consumer demand, and a greater awareness of the environmental consequences of servicing this demand alongside a desire for improved performance in these materials, is driving the development of a new generation of bioengineered materials.

Bondi's Solution

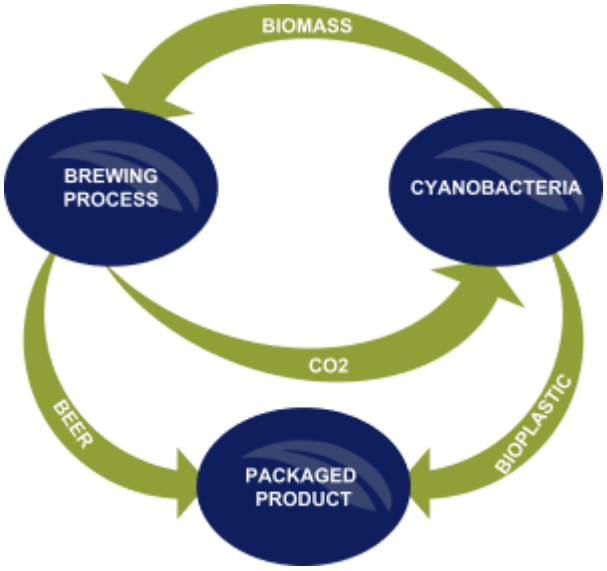
Advanced bioengineering offers an alternative route to manufacturing some of these materials. Bondi Bio is a **Solar Biomanufacturing** business. We bioengineer photosynthetic cyanobacteria to produce high-value target compounds from light, CO_2 and water. Cyanobacteria offer a particularly promising route to manufacture materials such as bioplastics.

Example Product – Bioplastics

Polyhydroxyalkanoates (PHAs) are a promising class of bioplastics which are naturally produced by cyanobacteria. PHAs are unique bioplastics that are completely biodegradable in soil and marine environments, have reduced environmental impact compared to petrochemically derived plastics but, have similar mechanical properties, and are processed in a similar manner.

For CO_2 producing industries such as brewing, the appeal of PHAs may be further enhanced by the ability to integrate bioplastic production and CO_2 consumption into the existing production process. This can allow a circular bioeconomy, whereby packaging is produced from a by-product of the existing process, and with the potential to utilize the residual cyanobacteria biomass as a feedstock for the existing process.

Example Production Cycle



About Bondi

Bondi is a Sydney-based solar bioengineering company focused on producing traditionally plant-derived Natural Products, at low cost from light and carbon dioxide and without the dependence on energy-crops or arable land.

Our target-agnostic platform combines the elegant evolutionary solutions of plants with the latest advances in biotechnology to design robust, reliable and sustainable cyanobacteria able to produce targeted compounds for a broad range of markets.

Our photosynthetic organisms are sustainable and beneficial to the environment. They fix carbon, do not require arable land and can be engineered to grow in sea, waste or polluted water sources.

They also offer a means to biomanufacture rare/complex Natural Products where existing chemical or biological solutions are inefficient or prohibitively expensive.

Innovate with Us

Bondi Bio is at the forefront of biomanufacturing and is working with industry leaders to create Natural Products for the future. If you would like to progress discussions with us, please contact us at **partners@bondi.bio** or fill in the form at **https://bondi.bio/partnerships**.

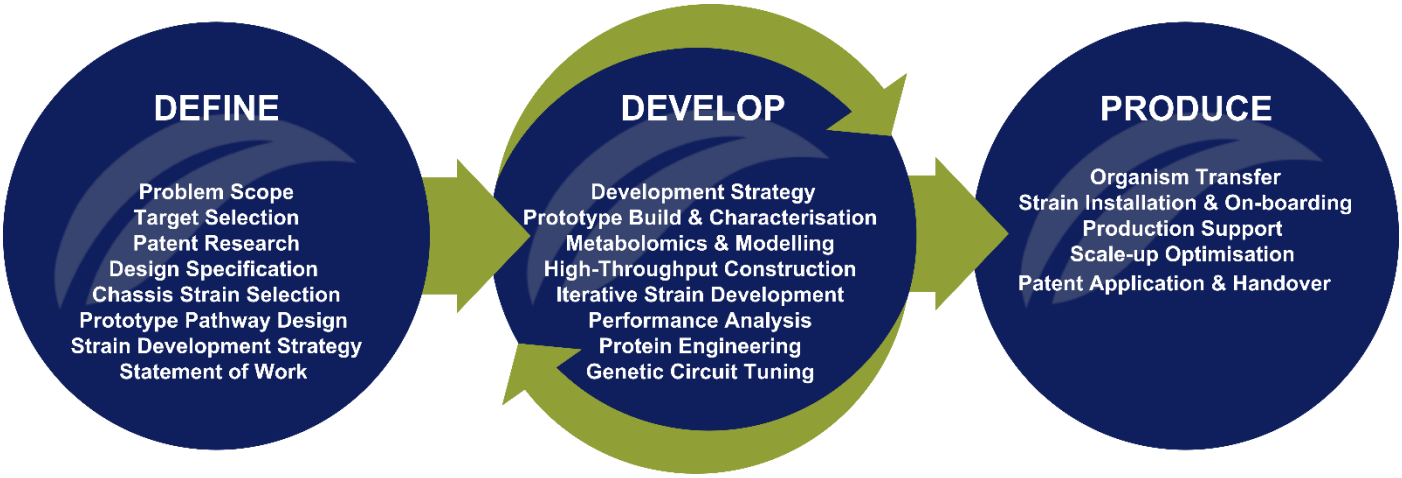
Bondi Bio Pty Ltd | contact@bondi.bio
ABN: 54 628 591 631

Our Approach

Science has revealed many of our planet's genetic secrets. Coupled with the huge advances in the writing and manipulation of DNA, it is now possible to use the power of millions of years of evolutionary optimisation to integrate production pathways from threatened species, or where the production levels are limited, to manufacture them in fast-growing and target-optimised cyanobacteria biofactories.

Our proprietary cyanobacteria strains build on the inherent benefits of cyanobacteria to produce Natural Products using biofactories that deliver:

- high growth-rate and photosynthetic efficiency relative to other photosynthetic platforms.
- global production with elevated robustness allowing them to cope and thrive in most conditions.
- existing metabolic pathways producing key terpene precursors, e.g. methylerythritol 4-phosphate (MEP) pathway.
- genetic tractability, allowing relatively straightforward genetic manipulation.
- native thylakoid membranes, providing the perfect environment to express complex plant proteins, e.g. the cytochrome P450 family of enzymes that represents an attractive Synthetic Biology platform for terpene biosynthesis.



Define - At Bondi, we work closely with you to define the problem space you have and build a design specification that meets your requirements. We consider your specific scenario and use that to determine the most appropriate solution for you. We take into account a wide range of parameters including target compound, growth environment, scale, use-case, extraction process and many more. We then generate a design that is the most appropriate solution for your specific circumstances and define a strategy and accompanying Statement-of-Work for the next phases of the process.

Develop - Having defined our design specification that addresses your problem space, we first prototype a Proof-of-concept solution, before going through an iterative strain development cycle, where we repeatedly Engineer and Test improved strains:

Engineer - We use our in-house design tools, libraries of genetic parts, and our proprietary high-throughput construction techniques to integrate our DNA designs into our optimised strains at a rate never before seen in cyanobacteria. This allows us to rapidly prototype a large number of variants, using a range of strategies, and to iteratively develop these for performance in our "Test" cycle.

Test - At Bondi, we utilize the latest advanced technology to analyse the performance of our cyanobacteria designs; detailed biochemical characterisation is aided by transcriptomic-, proteomic- and metabolomic-studies. The results of this analysis are then fed back into our computational models and drive future design decisions for continued iterations of strain engineering, until we reach the specifications agreed in the Statement-of-Work.

Produce - Our optimized strains are production platform agnostic allowing you to use the best available solution for your circumstances. Our strains can be engineered for batch or continuous production with both intracellular and extracellular compound accumulation possible. We envisage the use of closed-system flat-panel photobioreactors and can suggest appropriate suppliers but will design to your circumstances, and can assist you every step of the way to your final target compounds.