

Out with the old, and in with the Renewable: Gas fermentation for fuels, chemicals, materials and protein from renewable carbon.

Atmospheric CO₂ has accumulated to levels unprecedented since the Pliocene Epoch (> 2.6 million years ago). Although the effect of elevated atmospheric CO₂ on the climate has been predicted for 60 years, it wasn't until the 2015 Paris Agreement that nations agreed plans to abate atmospheric CO₂ release. These plans necessitate that renewable carbon increasingly displace fossil carbon as the feedstock for fuel, chemical and material production. The economic crisis triggered by the COVID-19 Pandemic has now added urgency to the demands for a move away from traditional polluting production systems. Numerous technology solutions have been proposed to enable this transition. Gas fermentation is the most recent of these. This technology uniquely offers a path to produce impactful volumes of sustainable products from abundant, low value renewable carbon feedstocks.

LanzaTech is pioneering the commercialization of a gas fermentation process that allows the continuous production of sustainable fuels, chemicals and protein from renewable carbon resources at scale. The first commercial plant is operating in China and has produced over 60,000 tons sustainable ethanol which is the equivalent of keeping over 100,000 tons of CO₂ from the atmosphere. Further commercial plants are in design or under construction with the process having been demonstrated with waste gas from numerous industries and synthesis gas produced from agricultural and municipal waste sources.

The potential for ethanol to be used as blend stock in gasoline has been well established for over a century. Through partnerships with consumer-facing companies such as L'Oréal and the Mibelle Group, LanzaTech has been excited to demonstrate the opportunity to use ethanol as a platform "CarbonSmart™" intermediate in the production of goods including cleaning products, plastics for packaging, and fibers for clothing. The development of a comprehensive synthetic biology capability for gas fermenting organisms has further enhanced this opportunity. Going forward the CarbonSmart™ concept will be applied to a range of chemical intermediates as gas fermentation organisms are precision engineered to make an array of novel chemicals from renewable carbon.