

22nd Biennial Congress of the South African Society for Microbiology (SASM2023),
Stellenbosch, 17-20 September 2023

Establishment of synthetic biology innovation and biofoundry lab in South Africa

Thimiri Govindaraj, Deepak B

Abstract:

Background: The Global Biofoundry Alliance (GBA) has been established between countries including the UK, US, Japan, Singapore, China, Australia, Denmark, and Canada through 16 research institutions. GBA plays a key role in the synthetic biology drive towards a new global bioeconomy that is accelerated by advanced technology innovation. Establishing a biofoundry program in South Africa and Africa will play a key scientific and strategic role in promoting synthetic biology and precision medicine programs in Africa. This would further enable bioeconomy and industrial development towards the SME program. We are currently establishing a biofoundry lab that will implement various synthetic biology and precision medicine projects in South Africa. **Methods:** We are currently establishing two research components in the CSIR Synthetic Biology and Precision Medicine Centre Biofoundry program, which includes industrial synthetic biology and functional precision medicine program. We implement the biofoundry biodesign and biological engineering Design-Build-Test-Learn (DBTL) cycle into our industrial synthetic biology and functional precision medicine program. In our industrial synthetic biology program, we are working on a) ValitaCHO: The development of a superior CHO cell line system for hyper-burst protein expression system using directed evolution and synthetic biology approaches, and b) Lactochassis: Designer microbes for industrial synthetic biology platform applications. **Results:** We are currently at the Design phase of the Design-Build-Test-Learn (DBTL) cycle in our industrial synthetic biology and functional precision medicine program. We have so far progressed in generation of the preliminary data on ValitaCHO cell-line chemstress fingerprinting profiling. We are currently designing the directed evolution approach to generate a superior CHO cell line. In the Lactochassis project, we are currently designing the computational biology-based genome mapping for the Lactochassis project. **Conclusion:** Using the biodesign DBTL cycle, we aim to implement our industrial synthetic biology and cancer precision medicine platform. These platforms will enable the establishment of one of the first Biofoundry labs in Africa.