CSIR Synthetic Biology and Precision Medicine Centre Bio-foundry Program

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Background: Global bio-foundry Alliance (GBA) has been established between countries including the UK, US, Japan, Singapore, China, Australia, Denmark, and Canada through 16 research institutions. Global bio-foundry Alliance plays the key role in the synthetic biology drivetowards a new global bioeconomy that is accelerated by advanced technology innovation.Establishment of Biofoundry program in South Africa and in Africa will plan key scientific and the strategic role in promoting synthetic biology and precision medicine program in Africa. This would further enable bioeconomy and industrial development towards SME program. At our CSIR Synthetic Biology and Precision medicine Centre, we are currently establishing biofoundrylab 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 Biologyand Precision Medicine Centre Bio-foundry program which includes industrial synthetic biology and functional precision medicine program. We implement 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: Development of superior CHO cell line system for hyper-burst protein expression system using directed evolution and synthetic biology approaches; b) Lactochassis: Designer microbes for industrial synthetic biology platform applications; In our Cancer Precision Medicine program: we are working on drug repurposing based drug sensitivity screening platform for B-cell malignancies and ovarian cancer treatment for South African patient cohort.

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 haveprogressed in generation of the preliminary data on ValitaCHO cell-line chemstress fingerprinting profiling. We are currently designing the directed evolution approach for generation superior CHOcell line. In the Lactochassis project, we are currently designing the computational biology based genome mapping for Lactochassis. In our precision medicine platform, we are currently progressing in design and build phase of platform where we have currently procured 770 cancer drugs for drug repurposing platform which can be applied for blood and ovarian cancer cohort.

Conclusion: Using Bio-design DBTL cycle, we aim to implement our industrial synthetic biology and cancer precision medicine platform at CSIR Synthetic Biology and Precision Medicine Centre. These platforms will enable establishment of one of the first Biofoundry labs in Africa.

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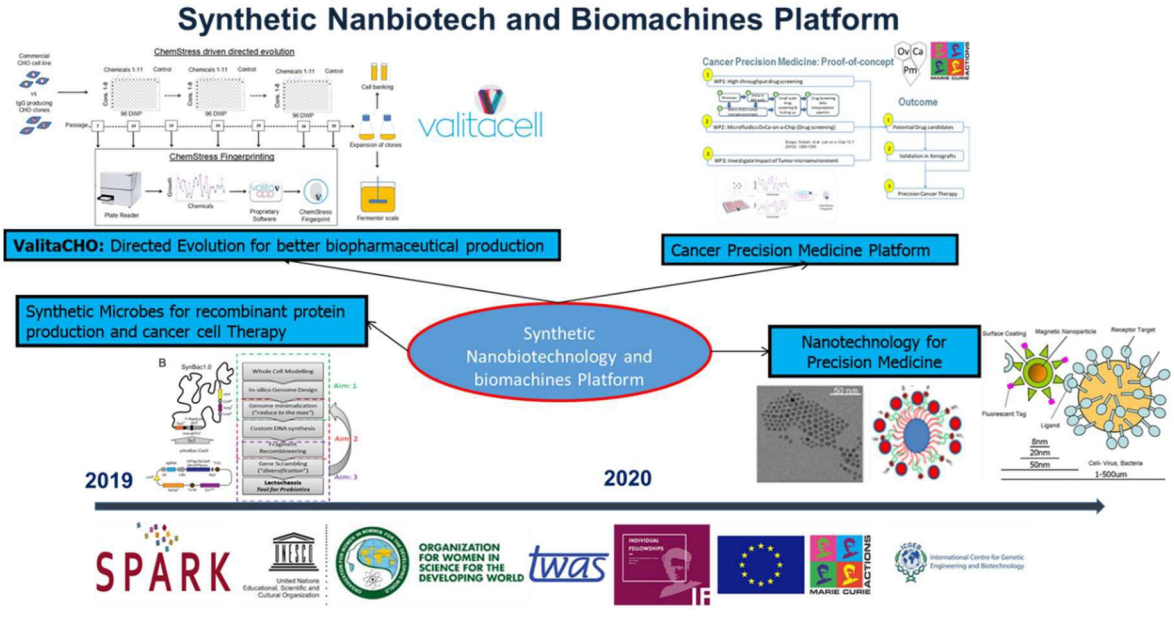

Figure 1: CSIR Biofoundry Program: Synthetic Nanobiotechnology and Biomachines Platform

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