Open Innovation for synthetic biology in LMICs

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Beneficial Bio | Gathering for Open Science Hardware | WEF Global Future Council on Synthetic Biology
What does “Open” mean?
universal access
e.g. availability of specific molecular tools unencumbered by intellectual property;

universal participation
e.g. greater involvement of beneficiaries in shaping projects using those tools;

collaborative production
e.g. multiple partners working together for a common goal

What does “Innovation” mean?
novel value
introduce something new to the market

build on what came before
change, adapt, link together existing inventions

usefulness
create a product or process that is of use in the real world and meets a need
CASE STUDY

Access to reagents through local production in Cameroon
Building the open technology
Open Enzyme Collection

- **Promoter**: His, Silica, Cellulose
- **Tag**: Chromoproteins, Fluorescent proteins, Enzymatic
- **Reporter**: Inteins, TEV, SUMO
- **Cleave**: Polymerases, Ligases, Reverse Transcriptases
- **CDS**: >60

Designed by: Open Bioeconomy Lab & many collaborators!
Synthesised by: FREE GENES
Distributed under: Open MTA
Funded by: SHUTTLEWORTH FOUNDATION, EPSRC, BBSRC
Plate Protein Expression on Autoinduction media

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Reclone.org (The Reagent Collaboration Network)  Open Bioeconomy Lab

Stephane Fadanka

Steps  Metadata  Metrics

ABSTRACT

The current protocol describes the preparation and use of 2X YT autoinduction medium for recombinant protein expression on Petri dishes. This protocol allows for reproducible and time effective expression experiments to be undertaken with minimal user intervention as compared to standard procedures using IPTG.
Protein expression analysis - SDS-PAGE

1 plate = 1000s PCR Reactions

*OpenVent (89KDa)
Implementation in MboaLab, Cameroon
Producing enzymes for molecular biology research
Products for sale to Cameroonian students, universities and research centres

Meeting market needs: more affordable, ambient temperature shipping & delivery in 1-3 days (not 2-8 weeks)

BenBio Eco Master Mix
$31.02

OpenVent DNA Polymerase Dehydrated
$19.50

BenBio Eco Master Mix Dehydrated
$13.00
Working towards impact
The Research in Diagnostics Collection is made available under an Open Material Transfer Agreement (which allows commercial use) and via Free Genes at no cost. It is now in **185 labs in 41 countries**, enabling research in diagnostics despite supply chain disruptions. Examples include:

- **Affinity Tags**: R5: silica binding, CipA: cellulose binding.
- **Cleavage**: TEV site: TEV protease, HutMCM2aa: salt-cleaved intein.
- **Terminators**: TZ: Strong triple terminator, T7term: late T7 terminator.

**Coding Seq**

- OpenVent, Bst-LF, HIV-RT, MMLV-RT, RNaseH, TEV Protease, HRP, T7 RNA Polymerase, Bsu, gp32, UvsX, UvsY, PBCV-1ligase.

*Fig 1: Research in Diagnostics Collection syntax for MoClo Assembly.*
LOCAL PRODUCTION OF DIAGNOSTICS IN LMICs

You are invited to contribute to the ongoing development of comprehensive and practical measures to catalyse and sustain production of diagnostics in low- and middle-income countries (LMICs).

Join us to hear feedback on progress and provide your input into next steps.
What we’ve learned about open innovation in synthetic biology

- People and process are key, technology is second
- Openness is a trade-off
- Patience, empathy and effort
- Your innovation may not be what you think it is, figure out your unique value-add
Get in touch!

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Beneficial Bio | Biomakespace | Gathering for Open Science Hardware
Free Genes: Open Source & Literally Free
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Open Bioeconomy Genes, Plasmids, etc.

Working closely with the Open Bioeconomy Lab at Cambridge UK and others we are making genes and plasmids available that enable people everywhere to freely access the basic tools of molecular biotechnology.

- **Open Enzymes (Part 1)**
  - $0.00

- **Open Enzymes (Part 2)**
  - $0.00

- **Open Reporters**
  - $0.00

https://stanford.freegenes.org/