Pushing boundaries in biotechnology with automated, rational strain construction

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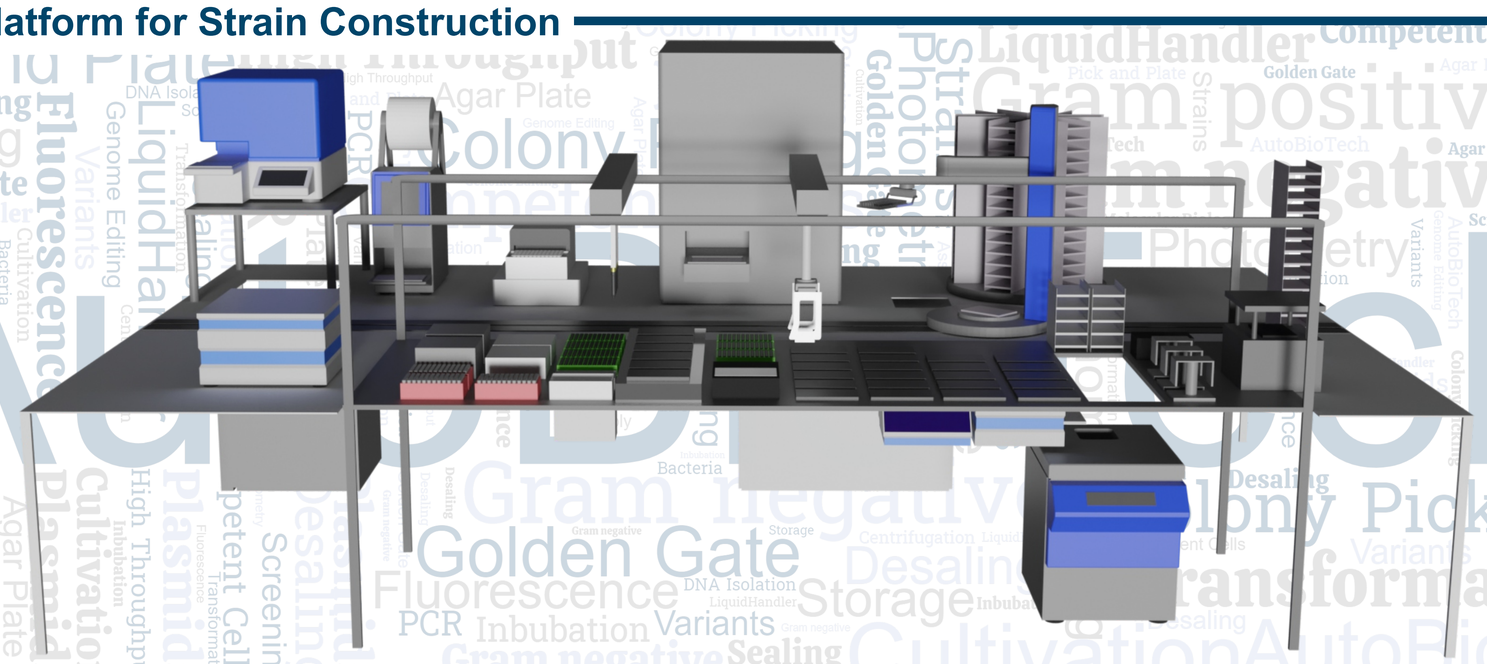
Introduction

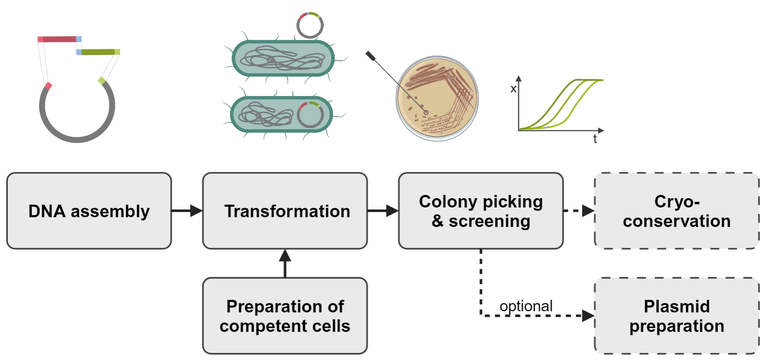
Motivation
- Rising demand for novel producer strains to satisfy bioeconomic needs
- Increased strain construction throughput with automation
- Platform organism like *E. coli* and *C. glutamicum* offer diverse application opportunities

Approach
- Robotic platform with 13 integrated devices
- Fully automated transformation and cultivation gram positive and negative bacteria
- Golden Gate based modular cloning of expression plasmids

AutoBioTech Platform for Strain Construction

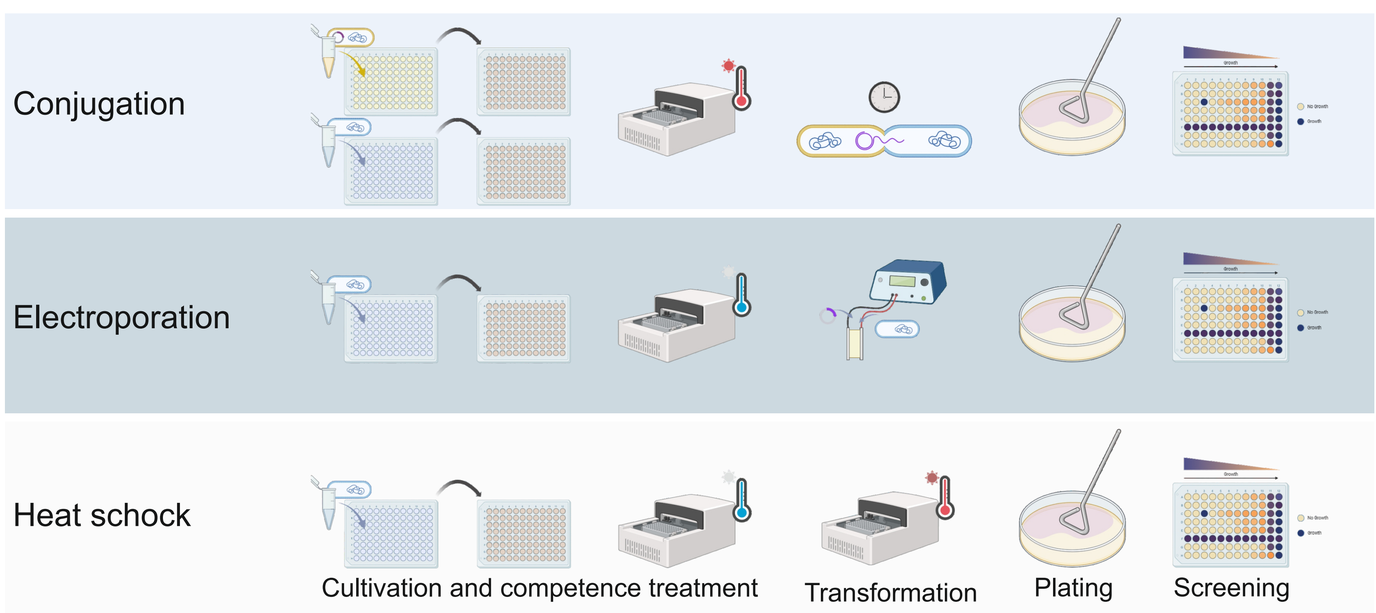


Standardized Worfklow Modules

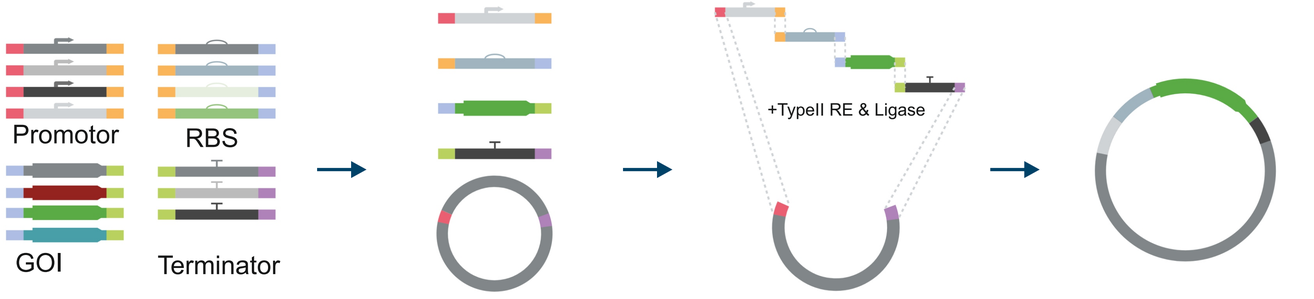


- **DNA assembly** using e.g. golden gate assembly
- **Transformation** into platform strains including plating onto SBS/SLAS sized agar
- On demand production of **competent cells**
- Automated colony **picking** and cultivation with **screening** for growth
- optional: **Glycerol stock** preparation and **plasmid preparation**

Available Automated Transformation Techniques



Rational Design by Modular Cloning[1] Approach



Library of genetic parts with different functionalities e.g to modulate expression

Specific, matching overhangs in parts and vector allow sequential arrangement

GoldenGate assembly eliminates overhangs. Choice of vector determines host

„Scarless“ plasmid ready to be tranformed into host of choice.

Conclusion

- AutoBioTech platform can accelerate research and development in diverse biotechnological applications
- Automation enhances the efficiency and reliability of biotechnological processes
- New opportunities for the exploration and optimization of biological systems
- Strains can be used for production of e.g enzymes, small molecules, or the biocatalytic synthesis of valuable pharmaceuticals.

Acknowledgements

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[1]:
Sonya V. Iverson, Traci L. Haddock, Jacob Beal, and Douglas M. Densmore
ACS Synthetic Biology 2016 5 (1), 99-103
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