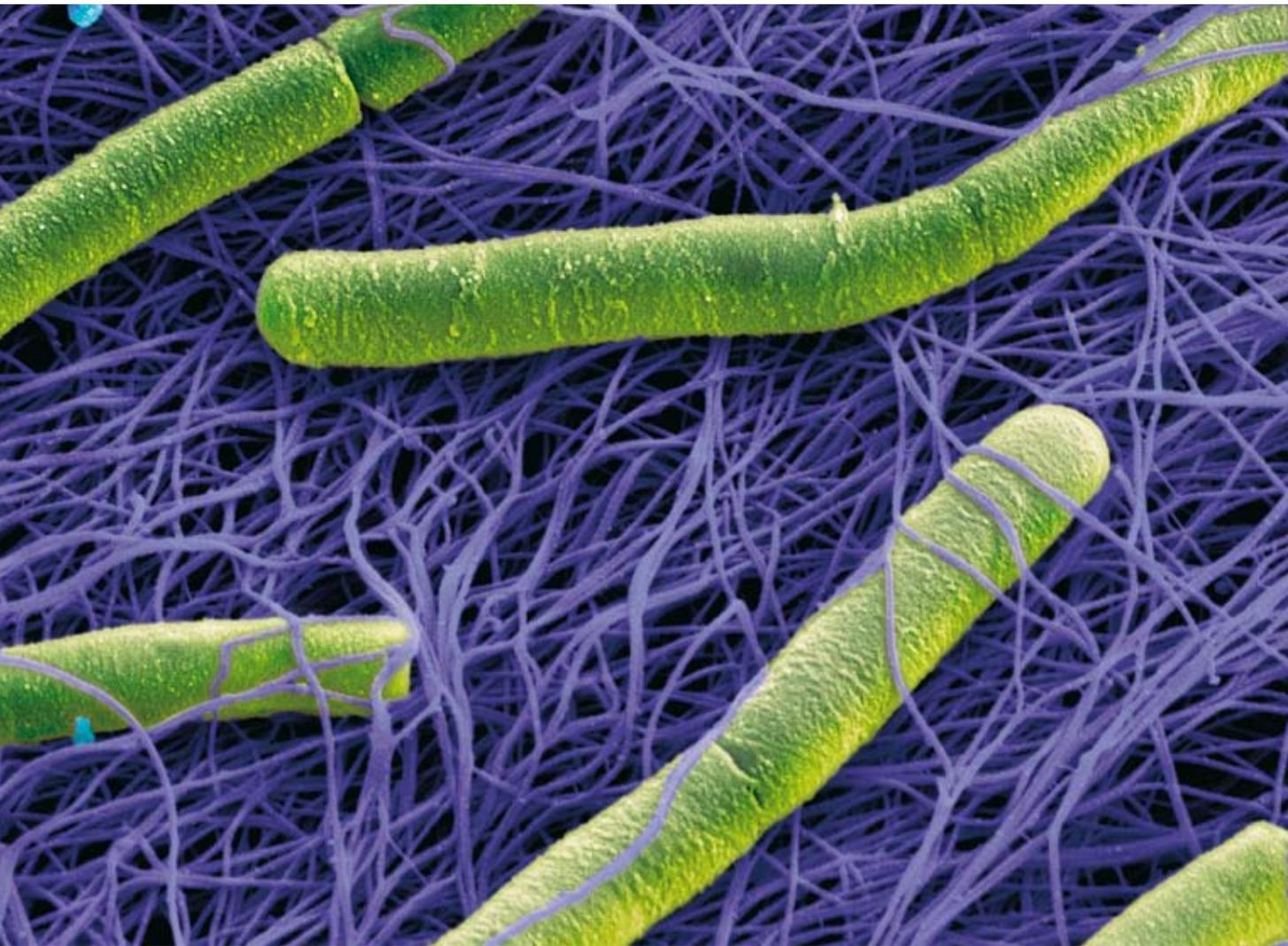


**Lonza**

**XS Microbial Expression Technologies™**



# XS Microbial Expression Technologies™

Based on 25 years of innovation in microbial biotechnology, Lonza has now established XS Microbial Expression Technologies™ as an advanced and versatile biopharmaceutical production platform. XS Technologies™ encompass a diverse assembly of expression systems that not only deliver high expression levels but also quickly enable the creation of a productive and efficient cGMP process.

## Unparalleled Versatility

Throughout the history of the biopharmaceutical industry microbial technology has been employed to produce an extraordinarily diverse array of recombinant products. No single strain or vector is capable of being the best expression option for all types of biopharmaceuticals; rather, different types of biopharmaceuticals require different types of expression technology. Lonza has assembled a collection of complementary proprietary expression systems that are screened in a high-throughput manner to identify the best production clone for your product.

XS Technologies™ have been assembled to allow for the production of every type of biopharmaceutical in development and on market, which includes:

- Antibody fragments (Fabs & scFv)
- Vaccines (protein & carbohydrate antigens)
- Cytokines & growth factors
- Novel protein therapeutics
- Plasmid DNA
- Peptides via concatemer-like approach

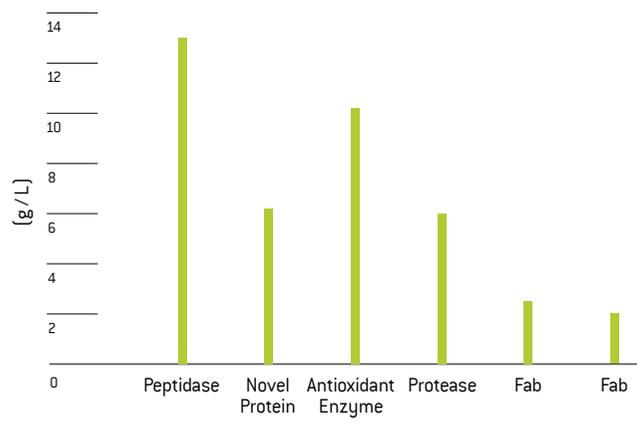
## Focusing on the Productivity of Your Entire Process

Improving your cost of goods by increasing product yields begins with boosting expression levels, but it doesn't end there. Whether it's *E.coli*, yeast or another microbe, several different strains and vectors exist within the collection of XS Technologies™. These systems have proven the ability to express at levels in excess of 10 g/L. Such industry-leading results are achieved through a combination of Lonza's novel molecular biology machinery with world-class fermentation sciences expertise.

XS Technologies™ are also conducive for the development of simpler recovery and downstream unit operations. For example, some of Lonza's novel systems drive expression into

the periplasm, and in some cases, your protein product is released extracellularly. A simpler downstream means shorter cycle times and less capital-intensive processes you can rely on.

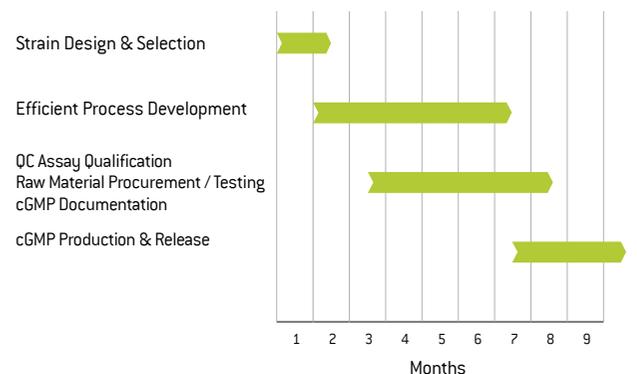
## Expression Levels Achieved for Therapeutic Proteins



## Faster to the Clinic, Faster to Market

Lonza understands that filing your IND and moving your drug or vaccine into the clinic is a critical step in the development of your product towards the marketplace. With the help of some key pieces of automated equipment, we have incorporated a high-throughput element into XS Technologies™, which makes it possible to quickly explore all of the options available. In less than six weeks Lonza can identify and confirm the best production clone and then in a few more months establish a suitable cGMP phase I/II process. Last, Lonza offers an express small-scale production service that is streamlined to deliver cGMP bulk drug substance as quickly as possible while vigorously adhering to the strict quality standards that Lonza is known for.

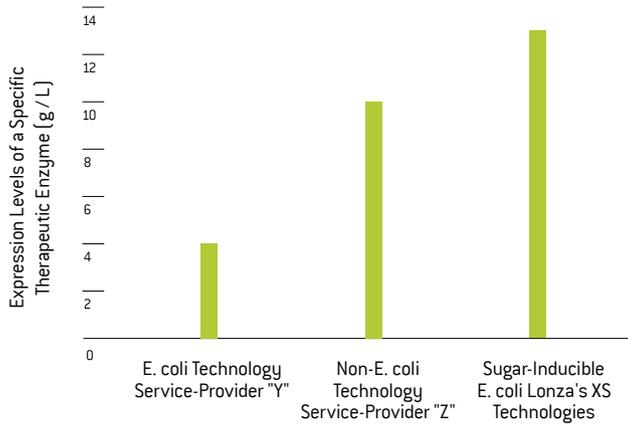
## From Gene to GMP Release in less than 10 Months



## XS Technologies™ Spotlight: Sugar Inducible *E. coli*

One of the most popular XS Technologies™ is Lonza's sugar-inducible *E. coli* system. This proven technology is comprised of a positively and tightly regulated expression system that is induced by either rhamnose or melibiose. Lonza's patented sugar-inducible systems have successfully been used in over 12 projects and are capable of achieving soluble expression levels well over 10 g/L. While the technology has shown it can express many types of proteins, it has established a niche track record for producing high-quality, correctly folded antibody fragments (including Fabs & scFv).

### Compare with Other Manufacturing Technologies

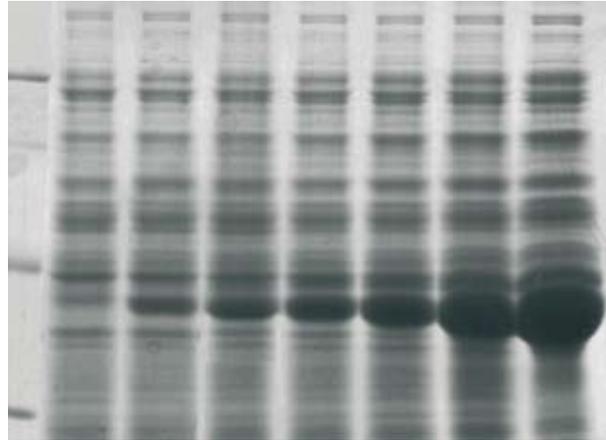


### System includes:

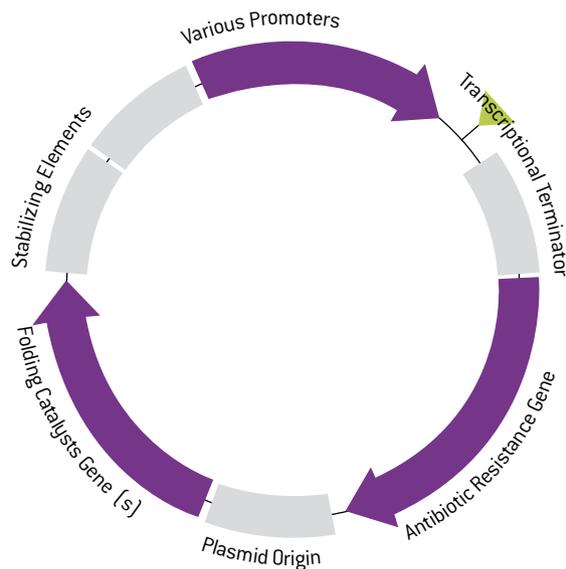
- 4+ different *E. coli* strains
- 4+ plasmid backbones with stabilizing elements
- 2+ promoters
- Numerous secretion signal options
- Maintained without antibiotic resistance markers options for either monocistronic or polycistronic expression
- Plasmid variants with different folding catalysts assist in folding complex proteins such as antibody fragments
- The same multicloning site for all plasmids
- Options for intracellular, periplasmic or extracellular secretion

### Benefits

- High soluble expression
- Yields high-quality, correctly folded protein
- Product easily recovered from the periplasm or released extracellularly
- Extremely low background
- Low-cost, non-toxic inducer



### Plasmid Map





To access the XS Technologies™,  
please contact:  
[XSTechnologies@lonza.com](mailto:XSTechnologies@lonza.com)  
Tel. +1 201 316 9200 North America  
Tel. +41 61 316 8211 Europe & Asia

More details can be found at:  
[www.lonza.com](http://www.lonza.com)

The information contained herein is believed to be correct and corresponds to the latest state of scientific and technical knowledge. However, no warranty is made, either expressed or implied, regarding its accuracy or the results to be obtained from the use of such information. No statement is intended or should be construed as a recommendation to infringe any existing patent.

#### Trademark

“XS Microbial Expression Technologies” and “XS Technologies” are both trademarks of Lonza Sales AG.

SEM picture on front © Martin Deggerli  
© 2008 Lonza Ltd, Basel Switzerland  
Printed in Switzerland