Molecular Biology Services

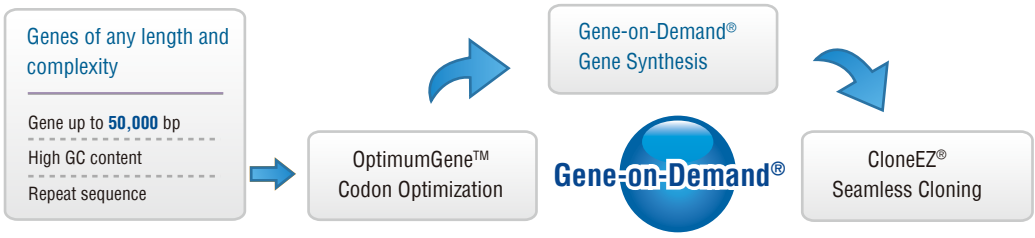
Make Research Easy

GenScript
Make Research Easy

Gene-on-Demand® Technology Platform

Any gene conceivable in any vector you desire

GenScript's Gene-on-Demand® technology platform combines patented OptimumGene™ codon optimization technology and CloneEZ® seamless cloning technology for the synthesis and cloning of the most challenging genes into any vector. Our ever increasing capacity and proprietary technologies enable us to deliver custom *de novo* genes with any length and any complexity at an economical price in a short turnaround time.



Proprietary Technologies

- Gene-on-Demand® gene synthesis
- OptimumGene™ codon optimization technology
- CloneEZ® seamless cloning technology

Gene-on-Demand® Gene Synthesis

Any gene you desire

Our Track Record

- 99.9% success rate for the construction of synthetic genes
- Over 98% of genes delivered on time
- Record synthetic gene length: ≥50,000 bp
- Over 6,000 clones delivered in three months for one project
- *De novo* synthesis of over 500,000 genes and constructs
- Expertise in synthesizing genes with:
  - Extremely high (>70%) or low (<30%) GC contents
  - Over 150 consecutive adenine residues
  - Repetitive sequences
  - Strong secondary structures
- Largest gene synthesis supplier in the world

Fast Turnaround

Gene Length	*Standard Delivery Time (Business Days)*
≤1,500 bp	10 - 12 days *
1,501 bp - 3,000 bp	14 - 17 days *
>3,000 bp	Upon request

* Not applicable to genes with complex sequences.

Quality

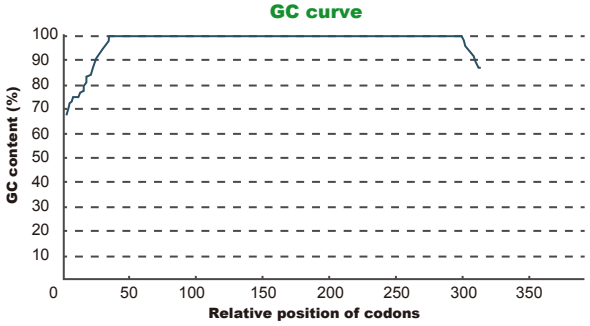
- Guaranteed 100% sequence fidelity
- Comprehensive quality documents
- ISO 9001:2008 certified
- PhD level customer service representatives

Case Studies

Genes with high GC content or long stretches of consecutive same type nucleotides are extremely difficult to synthesize due to their propensity for secondary structure formation. Below are two cases in which GenScript overcame these difficulties to deliver a custom product to a client in need.

Client A: Successful synthesis of a high GC content gene

Client A needed a gene synthesized with extremely high GC content. Several companies, failed to synthesize Client A's gene. The experts at GenScript however, were able to successfully synthesize Client A's gene (represented below) which contained a stretch of consecutive guanines and cytosines that spanned over 86% of the sequence.



Client B: Successful synthesis of a long polyA tail

Client B requested synthesis of a gene in which at least 120 consecutive adenines were required for function. Not only did GenScript synthesize the gene, but the final product contained 151 consecutive adenines, the number of adenine's in Client B's original design.

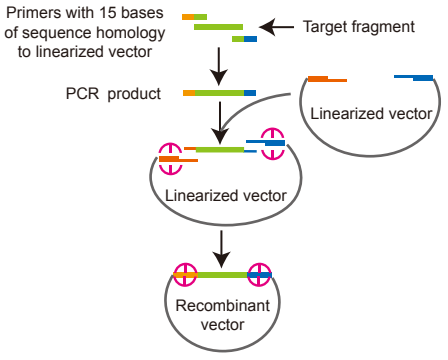
Special Partnership Program

GenScript offers special, competitive prices for Gene-on-Demand® gene synthesis services to our valued clients who want to establish a long-term preferred vendor contract with our organization. We will work with you in a flexible manner within your budget to help you achieve your goals for years to come. With our solid organic growth and financial performance, GenScript assures reliable and sustainable services.

CloneEZ® Seamless Cloning Technology

Any gene in any vector

- Clone any insert into any site of any vector
- Seamless joints, no extra or unwanted base pairs
- Compatible with high-throughput PCR cloning
- Clone any insert up to 12 kb
- Success rate over 95%
- 30-minute, one-step procedure



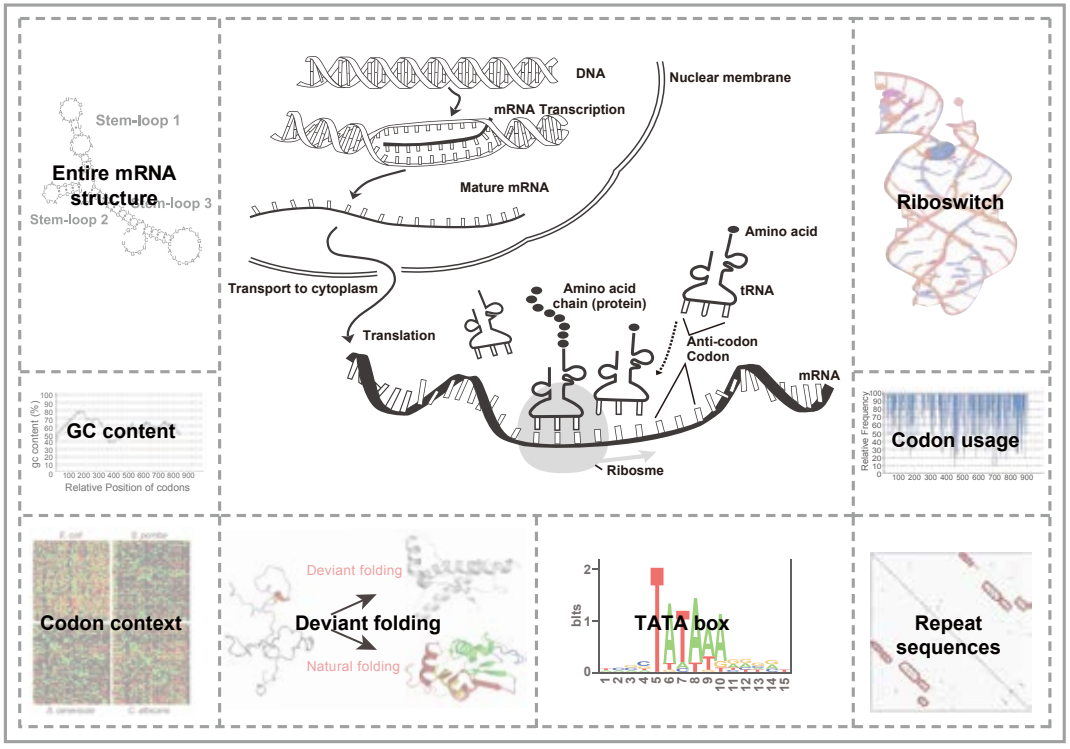
OptimumGene™ Codon Optimization

Increase Protein Yields, Decrease Frustration

GenScript's patented OptimumGene™ codon optimization algorithm is the most cited technology for gene design. In contrast to traditional optimization methodologies which only partially consider codon usage bias and mRNA structure, our algorithm considers the entire mRNA structure, various *cis*-elements, and codon adaptability, giving you the best sequences for obtaining the highest protein yields.

OptimumGene™ codon optimization typically increases protein expression levels in *E. coli* up to 100-fold, enabling you to obtain meaningful results while saving time and money.

Selected GenScript OptimumGene™ Codon Optimization Algorithm Parameters



- Premature PolyA sites
- Internal chi sites and ribosomal binding sites
- Codon and anti-codon interactions
- Negative CpG islands
- Terminal signals

Benefits

- Up to 100-fold increase in protein expression levels
- Comprehensive usage tables for optimization in any host species
- Professional service from PhD level customer service representatives

GenScript
Make Research Easy

OptimumGene™ Optimization Increases Protein Expression & Protein Solubility

Gene Name	Native			Synthetic			Expression	Solubility
	1	2	3	1	2	3		
CBR1	■	■	■	■	■	■	▲	▲
CBR3	■	■	■	■	■	■	▲	▲
GMDS					■	■	▲	▲
HADH2		■	■		■	■	▲	▲
HSD17B2	■	■		■	■		▲	
HSD17B4		■	■	■	■	■	▲	▲
MGC4172	■	■	■	■	■	■		
PECR				■	■	■	▲	▲
RETSDR2	■	■	■	■	■	■	▲	
SPR	■	■	■	■	■	■		

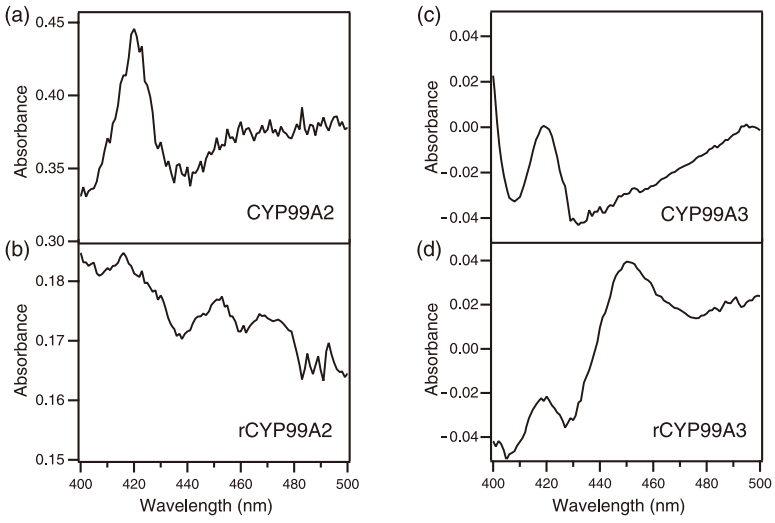
■ Expressed
■ Expressed, Soluble and Purified
□ Not Expressed

▲ Protein yield and/or solubility was improved after gene was codon optimized

1. Total Cellular Protein
2. Soluble Fraction
3. Eluted Fraction

*Comparison of protein expression levels from native and OptimumGene™ optimized gene sequences. Native and OptimumGene™ optimized versions of genes (Synthetic) were cloned and expressed in *E. coli*. Subsequent cell lysates were analyzed by SDS-PAGE.
*Adapted from Fig 2. of Burgess-Brown NA, et al. Codon optimization can improve expression of human genes in *Escherichia coli*: A multi-gene study. Protein Expres Purif. (2008) 59: 94-102

OptimumGene™ Optimization Enables Functional Folding of Recombinant Enzymes



*Recombinant cytochrome P450 mono-oxygenases, CYP99A2 & CYP99A3, expressed from native genes (a) & (c); and from OptimumGene™ codon optimized genes (b) & (d). Absorbance peaks at 420 nm and 450 nm indicate mis-folded (inactive) proteins and properly folded (active) proteins, respectively.

*Adapted from Fig. 4 of Wang Q, et al. CYP99A3: functional identification of a diterpene oxidase from the momilactone biosynthetic gene cluster in rice. Plant J. (2011) 65: 87-95

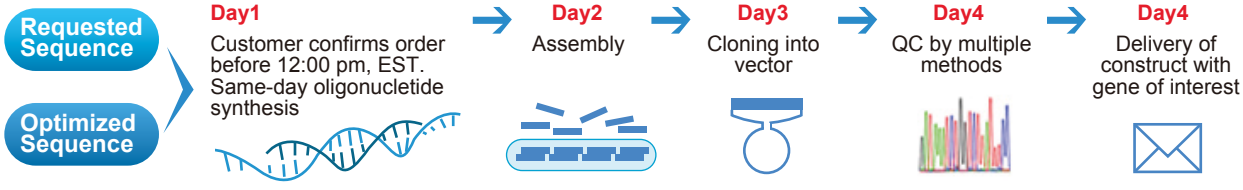
Selected Publications

M. J. Smeulders, et al. Nature (2011) 478: 412-416
S. K. Yoo, et al. Nature (2011) 480: 109-114
G. Bouvignies, et al. Nature (2011) 477: 111-117

FREE codon optimization service is available.

Rush Gene Synthesis Service

Synthetic genes in as few as 4 business days



Molecular Biology Services

Make Research Easy

GenScript provides a comprehensive portfolio of molecular biology services for your daily research. Let us do the tedious work, you do the research!

Gene Synthesis
—— Any gene you desire

- Guaranteed 100% sequence fidelity
- Largest capacity at 6.5 million bp/month
- Free OptimumGene™ codon optimization

Custom Oligos
—— Affordable modified/labeled oligos

- Comprehensive modifications and labeling
- Flexible synthesis scales
- Cost-effective with high quality

Rush Gene Synthesis
—— Speed comes from experience

- 100% sequence guarantee
- Free OptimumGene™ codon optimization
- In as little as 4 business days

DNA Sequencing Service (in North America)
—— Rapid sequencing at low prices

- 4 free reactions for new sequencing customers
- Bulk discount pricing available
- Convenient online ordering and data retrieval

Gene-Brick™ Synthesis Service
—— New building bricks for synthetic biology

- ~ 10 kb long building bricks
- 100% guaranteed sequence fidelity
- Fastest turnaround time in the market

Mutagenesis
—— Any variant from your design

- Starting from $149/mutation
- Unparalleled accuracy
- Large constructs up to 12 kb

Custom Cloning
—— Any construct you want to build

- Starting from $149/construct
- CloneEZ® seamless cloning technology
- Reliable results with quality assurance

High-throughput Protein Variants Service
—— Get 1,000 protein variants in 30 days

- Fast turnaround
- Save up to 70%
- Fully customized

Plasmid Preparation
—— Any amount to fit your plan

- Starting from $50/preparation
- Flexible scale up to gram level
- Endotoxin level below 0.005 EU/μg
- Quality GLP-compliant service

Mutant Libraries for Protein Engineering
—— You design it, we build it

- Site-directed mutagenesis libraries
- Degenerated libraries
- Randomized libraries
- Customized libraries

GenPool™ ORF Cloning
—— Any ORF in any vector

- 2.5 million ORFs from 186 different species in the database
- ORF genes cloned into any vector of your choice
- As low as $0.29/bp

Vector-Based siRNA and miRNA
—— Any vector, transfection ready

- Advanced siRNA design software
- Unbeatable price at $425/construct

1-732-885-9188

Fax: 1-732-210-0262 / 1-731-885-5878 Web: www.genscript.com Email: gene@genscript.com

860 Centennial Ave., Piscataway, NJ 08854, USA | Toll-Free: 1-877-436-7274 | Tel: 1-732-885-9188 | Fax: 1-732-210-0262 | Email: info@genscript.com

GenScript
Make Research Easy