

Introducing

AminoLogics

Amino Acids Business

April 2016

AminoLogics



Part 1_ **I n t r o**

Part 2_ **T e c h n o l o g y &
P r o d u c t s**

Part 3_ **F a c i l i t i e s**

Part 4_ **B u s i n e s s
f o c u s**

Company Profile

Company	AminoLogics Co., Ltd.	
Founded	September, 1997	
Headquarters	Gangnam-gu, Seoul, Korea	
R&D Center	Sungnam, Gyeonggi-do, Korea	
CEO	J.S. Oh, S.S. Oh	
Business	Amino acids, amino acids derivatives, pharmaceutical intermediates, and API	

Company History

1997

- Established Alogics Co., Ltd. to manufacture semi-conductors

2000

- Developed Color Quad ASIC, DVR ASIC

2004

- Certified as a “venture corporation”
- Listed on the KOSDAQ stock market

2006

- Developed DVR Soc, CCTV Soc

2009

- Acquired by AminoLux Co., Ltd.
- Changed its name to AminoLogics Co., Ltd.
- Founded Amino Acid Business Unit

2010

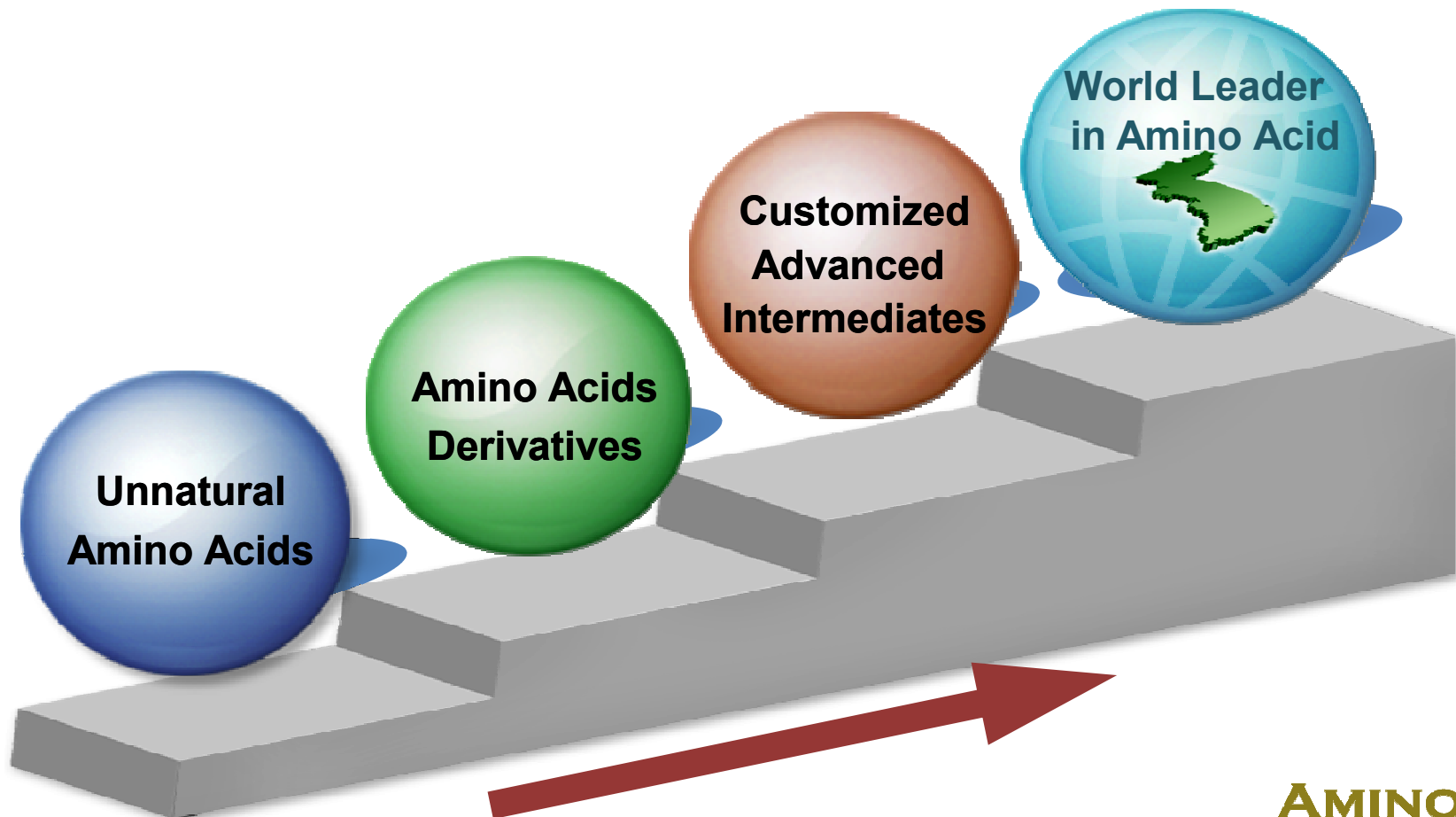
- Selected as one of 10 core participant companies for WPM (World Premier Materials) Program(R&D Projects from Korean Government) 2010-2019

2014

- Acquired by Samoh Pharm Co., Ltd.

Amino Acids Business

**Development, Manufacturing, and Supply of
Unnatural Amino Acids, Amino Acids Derivatives, and
Amino-Acid Based Advanced Intermediates with World's Best Quality**





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Part 3_ **F a c i l i t i e s**

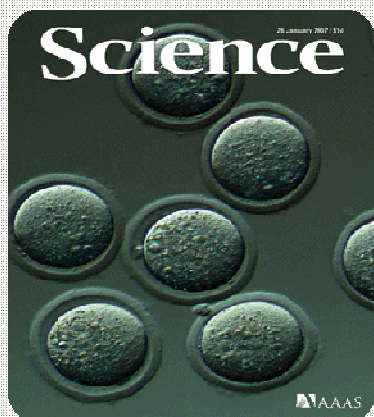
Part 4_ **B u s i n e s s
f o c u s**

Core Technology **ARCA Technology**

- **Inventor:** Professor Kwan-Mook Kim, Ewha Womans University
- **Publication:** Science Magazine (2007, 315, 438), J.Org. Chem. (2008, 73, 5996-5999), J.Am.Chem.Soc. (2007, 129, 1518-1519), Organic Letter (2005, 6, 2591), Organic Letter (2005, 7, 3525-3527)



Science Magazine (2007, 315, 438)



“The authors have prepared a small-molecule receptor that binds amino acids through a similar motif but also incorporates a chiral binaphthyl backbone.”

Science Magazine
Volume 315, Number 5811, Issue of 26 ,
January 2007

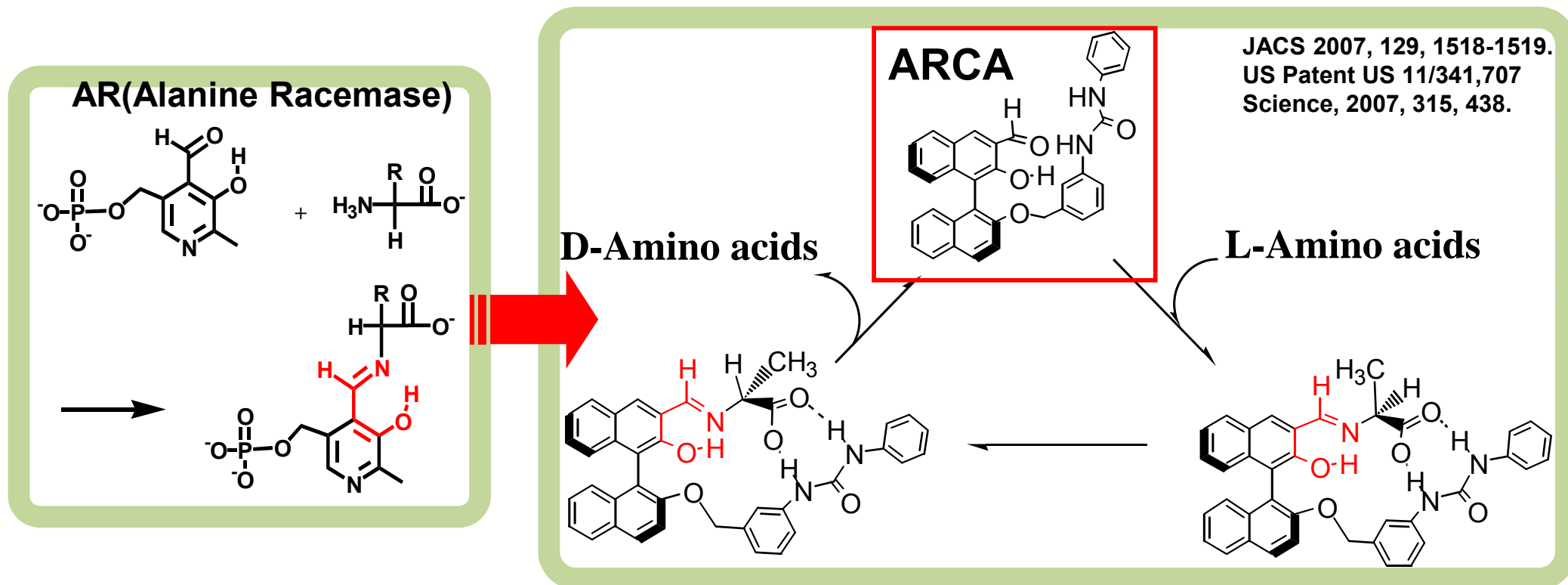
J.Am.Chem.Soc. (2007, 129, 1518-1519)



“Bioinspired Chemical Inversion of L-Amino Acids to D-Amino Acids”

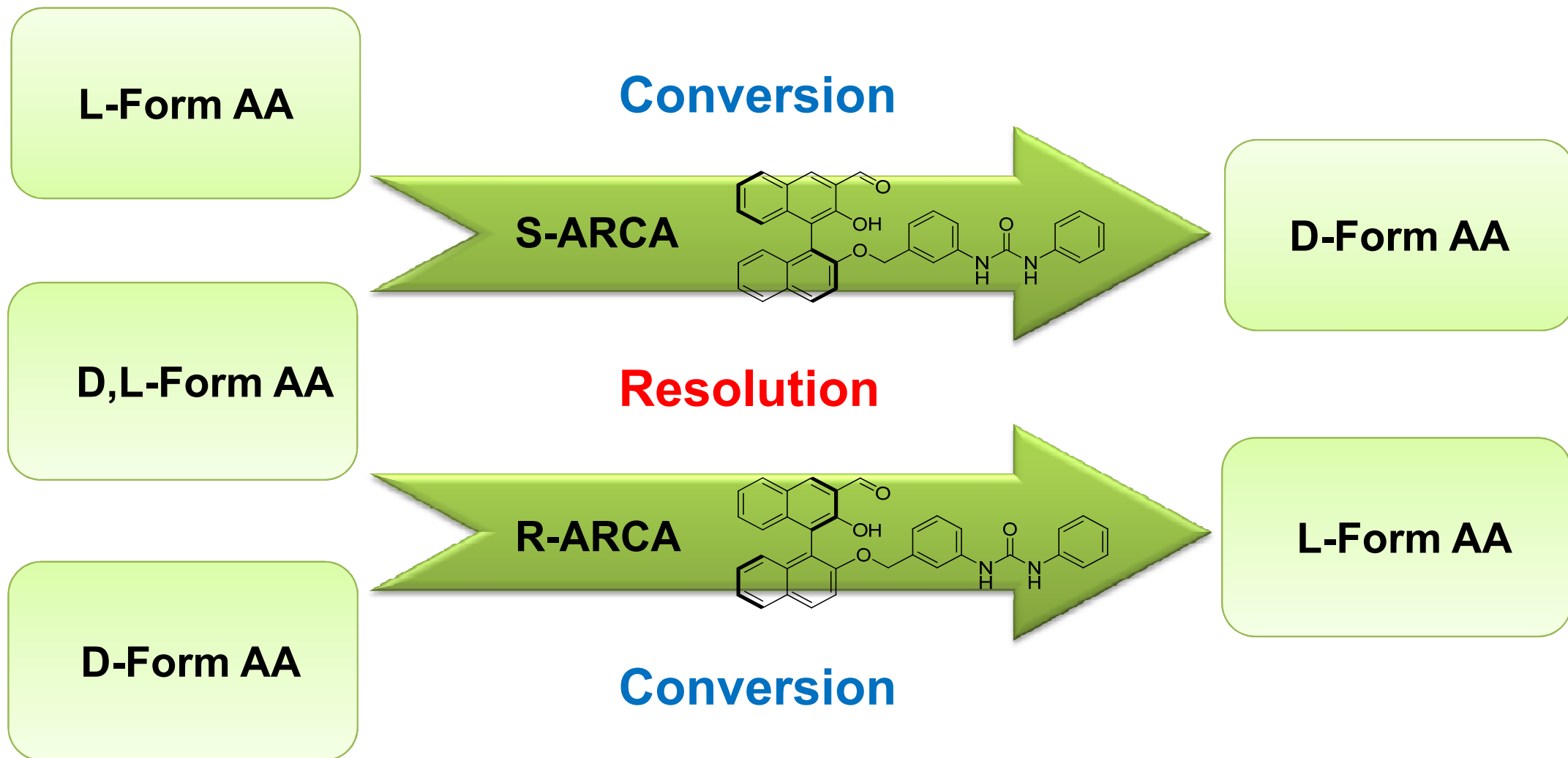
Journal of American Chemical Society
Volume 129, Number 6, January 2007

ARCA Technology Overview

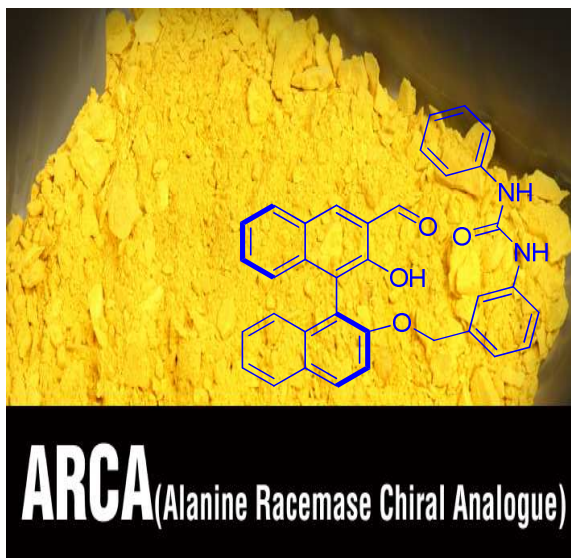


- ARCA is a small molecule chiral receptor that binds amino acids through a similar motif of Alanine Racemase but also incorporates a chiral binaphthyl backbone.
- While AR is only able to transform L-Amino Acids into their DL-racemic mixture, ARCA is able to transform DL-racemic mixtures into D-amino acids or L-amino acids

ARCA Technology - Conversion & Resolution



ARCA Technology Highlights



Price Competitiveness

Raw Material (Racemic/L-Amino Acid) + Process Fee

Broad Substrate Scope

α -Amino Acid, β -Amino Acid, 1,2-Amino Alcohol

Multi-Scale Process

Cost-effective process applicable in any scale

High Quality

High enantiomer excess

Efficient Process

Simple process through a circulation of ARCA and solvent

Expertise in Other Chiral Technologies

Other Technical Capabilities

- **Crystallization-induced Asymmetric Transformation**
- **Dynamic Kinetic Resolution**
- **Chiral Inversion**
- **Diastereomeric Resolution**
- **Derivatization of Amino Acids, Amino Alcohols and Other Amine Compounds**

Process Development

- **Process Development From Lab to Pilot to Full Commercial**



Main Products

Product Group	Product	CAS No.	Dev. Stage	Available Derivatives Forms
Amino Acid & Derivatives	D-Alanine	338-69-2	Commercial	Boc-, Fmoc-, CBZ-
	D-Arginine	157-06-2		-HCl, Fmoc/Pbf-, Boc/Tos-, Fmoc/Tos-
	D-Cysteine	921-01-7		-HCl H ₂ O, Boc-, Boc/AcmS-, Fmoc-, Fmoc/tBuS, Fmoc/TrtS
	D-Histidine	351-50-8		Boc-, Fmoc-, Fmoc/TrtN-, CBZ-
	D-Homophenylalanine	82795-51-5		Boc-, Fmoc-
	D-allo-Isoleucine	1509-35-9		Boc-, Fmoc-
	D-Leucine	328-38-1		Ac-, Boc-, Fmoc-, CBZ-
	D-Phenylalanine	673-06-3		Boc-, Fmoc-, CBZ-
	R-Beta-Phenylalanine	13921-90-9		Boc-, Fmoc-
	S-Beta-Phenylalanine	40856-44-8		Boc-, Fmoc-
	D-Serine	312-84-5		-Me, -OMe HCl, Boc-, Fmoc-, Fmoc/tBuO-, CBZ-
	L-Serine	56-45-1		-Me, -OMe HCl, Boc-, Fmoc-, Fmoc/tBuO-, CBZ-
	D-allo-Threonine	24830-94-2		Boc-, Fmoc-, Fmoc/tBuO-
	3-(2-Naphthyl)-D-alanine	76985-09-6		Boc-, Fmoc-, CBZ-
	3-(2-Naphthyl)-L-alanine	58438-03-2		Boc-, Fmoc-, CBZ-
	4-Chloro-D-phenylalanine	14091-08-8		Boc-, Fmoc-
	4-Chloro-L-phenylalanine	14173-39-8		Boc-, Fmoc-
	3-(3-Pyridyl)-D-alanine	70702-47-5		Boc-, Fmoc-
	3-(3-Pyridyl)-L-alanine	64090-98-8		Boc-, Fmoc-
	3-(2-Thienyl)-L-alanine	22951-96-8		Boc-, Fmoc-
	D-Lysine	923-27-3	R&D	Boc-, Fmoc-
	D-Proline	344-25-2		Boc-, Fmoc-
	D-Threonine	632-20-2		Boc-, Fmoc-, Fmoc/tBuO-
	D-Tryptophan	153-94-6		Boc-, Fmoc-, CBZ-, Fmoc/BocN-
	D-Valine	640-68-6		Boc-, Fmoc-
Other Amino Acid Derivatives	3-Chloro-D-alanine OMe.HCl	112346-82-4	Commercial	
	Boc-D-Bpa-OH	117666-94-1		
	Fmoc-D-Cha-OH	144701-25-7		
	Fmoc-D-Hse(Trt)-OH	257886-01-4		
	Fmoc-Hse(Trt)-OH	111061-55-3		
	Fmoc-Oic-OH	130309-37-4		
	Fmoc-D-Tic-OH	130309-33-0		
	Fmoc-Trp(Boc)-OH	143824-78-6		

- Price competitiveness
- Broad substrate scope (Various clinical projects/peptide synthesis use)
- High quality
- KG-MT scale production ready
- Custom-development and scale-up available



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R&D Facilities

Quality Control

HPLC System (Including 5 UPLC)	16set	OP, CP, Assay
GC System (with Headspace)	1set	Residual Solvent
IC	1set	Pos / Neg Ion Analysis
Automatic Polarimeter	1set	Specific Rotation
Titration	2set	Titration Assay
UV System, FT-IR, Oven, Muffle's Furnace, Ultra-pure Water Plant, etc. (Over 40 Equipments)		



R&D Facilities

Pilot (In-house Facilities)

< Work-up Glass Reactor 20L System >

- Made by Korean Domestic glass
- Dimensions/approvals
 - ✓ Height 1.50m approx / ✓ Width 1.00m approx
 - ✓ Length 1.00m approx / ✓ Total Volume 21LT
- Permitted operating conditions
 - ✓ Permitted operating pressure reactor -1/+0.5 bar
 - ✓ Permitted operating tempera reactor -30/+200 °C
- Materials
 - ✓ Wetted parts – Borosilicate glass 3.3

< GR 20 Reaction System >

- Made by Buchi glass (Reactor body with bottom valve)
- Dimensions/approvals
 - ✓ Height 2.0m approx / ✓ Width 1.00m approx
 - ✓ Length 1.00m approx / ✓ Total Volume 21LT
- Permitted operating conditions
 - ✓ Permitted operating pressure reactor -1/+0.5 bar
 - ✓ Permitted operating tempera reactor -60/+200 °C
- Materials
 - ✓ Wetted parts – Borosilicate glass 3.3



Production Facilities

Pilot Scale

- **Ulsan Fine Chemical Industry Center (UFIC) GMP-like facilities**
 - **Reactor** : GL 100L, GL 250L, GL 630L
 - **Filter** : Nutsche filter (50L, 100 L, 200L), Filter & dryer (300L)
 - **Dryer** : Vacuum dryer (500L, 1,500L), Rotary dryer (400L)
 - **Mill** : Co-Mill (cap. 200L/hr)



Production Facilities

Commercial Scale

- Contract manufacturing GMP / Non-GMP facilities
- Samoh(Parent Company) GMP facilities



Types	Sizes	Other Equip.
G/L Reactor	3.0 m ³ 5.0m ³ 2.0 m ³ 3.0 m ³ 0.10m ³	Dryers (2) Oscillator Co-Mill Pin-Mill Nutche- Filter Centrifuge
SUS Reactor	5.0m ³ 4.0 m ³ 3.0 m ³	
Tef. Reactor	2.0 m ³	

- New facilities (scheduled to open in June, 2016)



Types	Sizes	Other Equip.
G/L Reactor	7m ³ 5m ³	Nutche Filter Centrifuge Pin-Mill Fluid Bed Dryer Vacuum Oven Dryer Column Tower Molecular Distillator
SUS Reactor	5m ³ 5m ³ 2m ³	

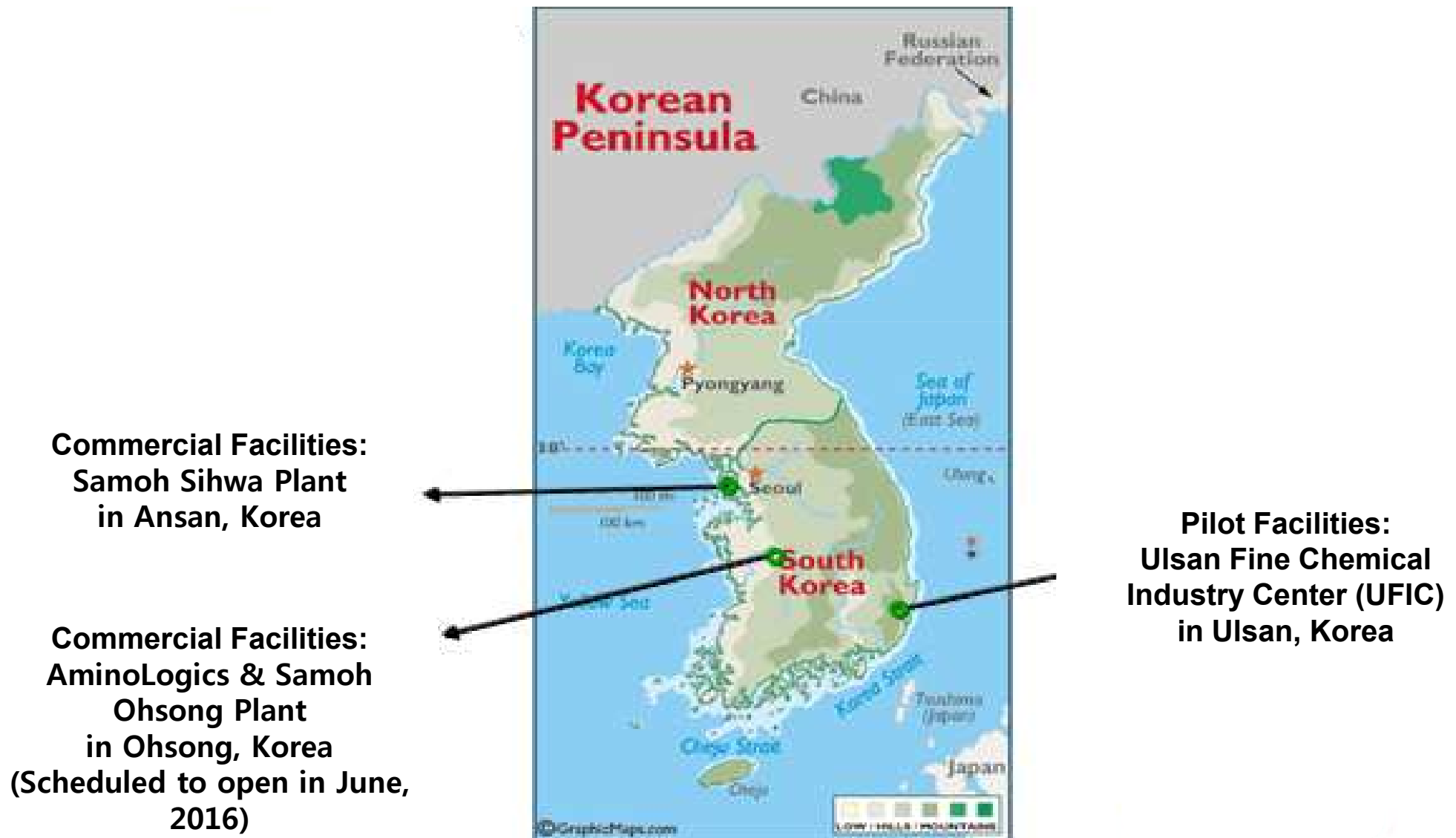
Production Facilities

Image of New Production Facilities



Production Facilities

Location of Production Facilities



The background of the slide features a stylized world map composed of a grid of small dots. Overlaid on the map are two thick, wavy lines: a green one on top and a grey one below it, both curving from the left side towards the right.

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Focus in Unnatural Amino Acids

D-Amino Acids are key elements for 3,000s of Amino Acids Derivatives

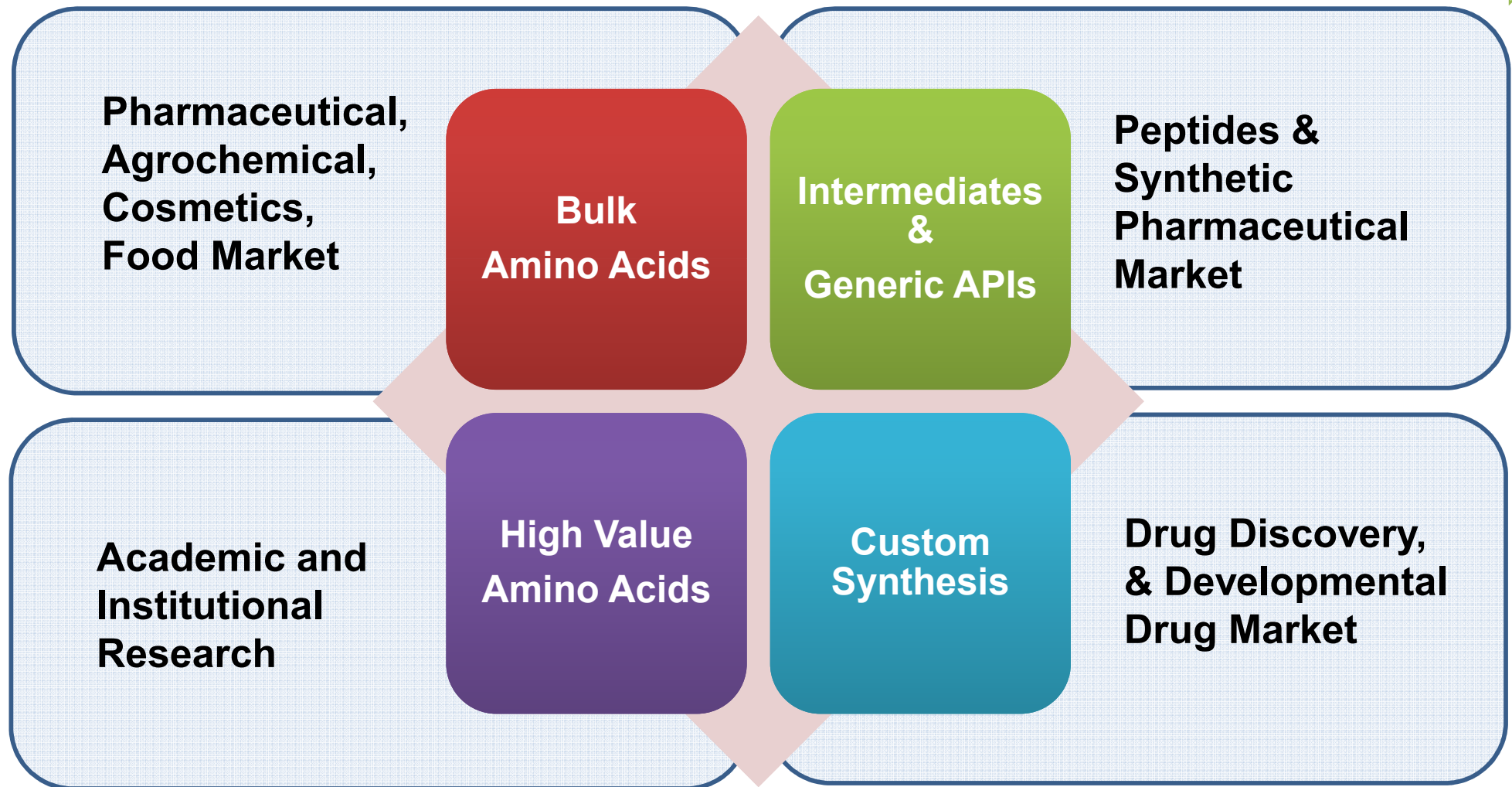
- High-Value Active Ingredients & Active Pharmaceutical Ingredients

Commercialization of ARCA Technology
→ New Market Frontier

- Meeting the Unmet Needs - Providing Technology & Low-Cost Solutions
- Market Expansion – Synergy Effects by Collaborating with Bio- and Pharmaceutical Industries

Unnatural Amino Acids and More

Unnatural Amino Acids Manufacturer to Integrated Solution Provider



T h a n k Y o u !