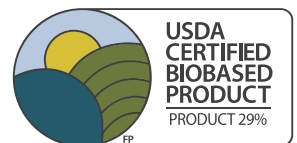
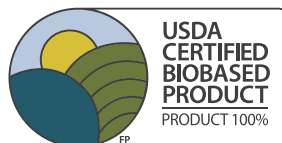


small changes **AROUND** our **BLUE** planet



CLC
BIO-BASED



Made by Nature

CLC is world's first covalently bonded cellulose-based polymer that uses natural biomass as a raw material.

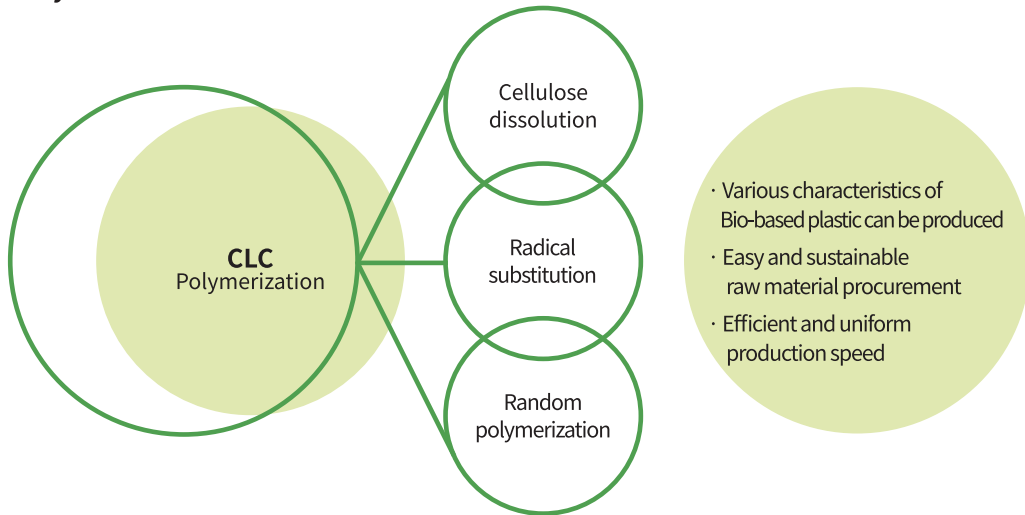
It is made by Around Blue's own interfacial polymerization technology.

CLC Bio-Based plastic can be processed in both injection and extrusion molding using wood powder, rice husk, corn flour, coffee grounds, or beer grounds as a biomass raw material.

CLC is an eco-friendly/non-toxic bio-based plastic that can be easily molded without complicated extraction process from natural raw material. It still fulfills the international environmental standards with the quality while providing cost-effectiveness, productivity and efficiency at the same time.



CLC Polymerization



CLC 4 FEATURES



Natural decomposition *

Using non-toxic natural raw material such as wood flour etc, naturally decomposed after use.



Strong physical property

By using interfacial polymerization between heteromaterials, it features a strong physical property.



Adjustment of decomposition period

Decomposition period can be adjusted by different application.



Cost competitiveness

Without complicated extraction process, it costs less compare to any other bioplastics in the market.

*Natural decomposition | It does not meet the biodegradable standards (90% in 6months), however it decomposes naturally in appropriate period (Approx. 30years) when discarded after use

CLC FEATURES



It is USDA certified 100% natural carbon, an eco-friendly, non-toxic bio-based plastic.



100% Bio-based

100% bio-based products using natural raw material (Food grade).



Eco-friendly

When decomposed, it returns to eco-friendly material in nature (Certain grade).



Natural decomposition

By adjusting usage and decomposition period, it returns to nature.



Non-toxic

Using non-toxic materials, it is harmless to humankind and nature.



No Microplastics

It is biodegraded without microplastics. It returns to nature or recycled.

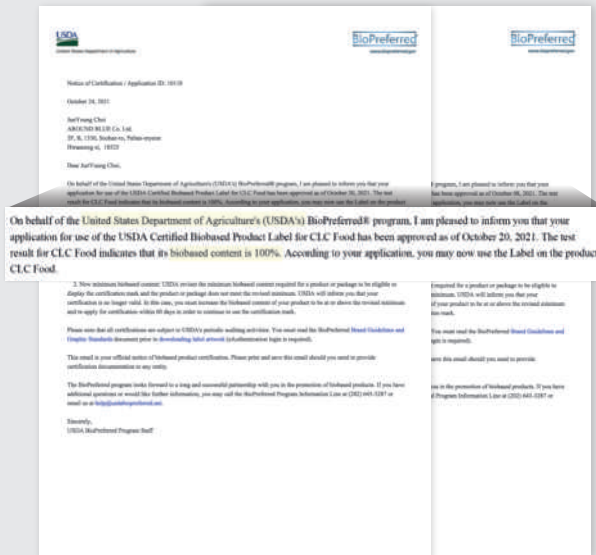
CERTIFICATION

Around Blue's CLC has been proven for its safety by accredited institution. CLC is a safe and reliable material from harmful substances or environmental hormones.

USDA 100% Biobased Certification



BETA Analytic US Testing Laboratory Report



THE CHARACTERISTICS CAN BE ADDED TO CLC

According to various applications, necessary characteristics can be added to CLC while it still keeps eco-friendly and non-toxic characteristics at reasonable cost compare to existing petro-based plastics.



Water resistance /Chemical resistance

It is applicable to food containers and living supplies by adding Water resistance/Chemical resistance.



Heat resistance

It has maximum 120°C heat resistance so that it is suitable to food containers.



Strong physical property

By using interfacial polymerization between heteromaterials, it features a strong physical property.



Flame-retardant

It is applicable to construction materials by adding flame-retardant.



Post-processing

It can be printed, plated and deposited on the surface and it is applicable to various products.



Anti-bacterial

It is applicable to hygienic goods and baby products by adding antibacterial.

8 heavy metals / RoHs harmful substances / phthalates FREE



BPA FREE

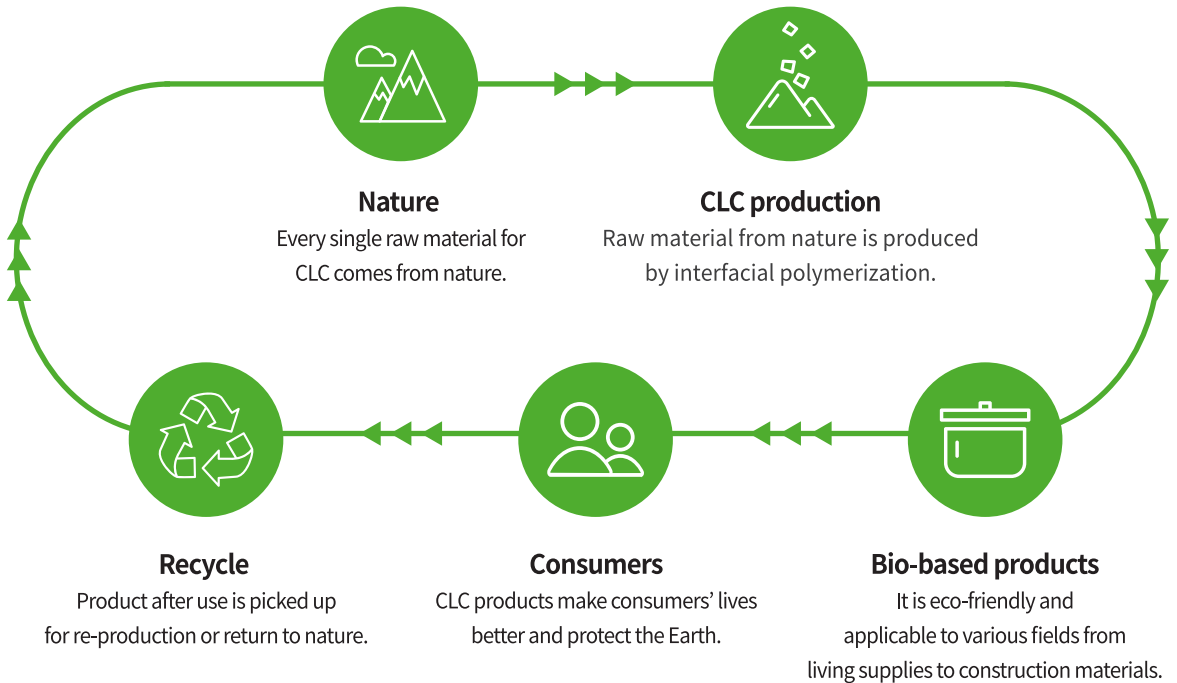


Heat resistance



CLC CIRCULAR ECONOMY SYSTEM

CLC is made from natural ingredients, can be recycled/reproduced after use, and is returned to nature when discarded.



CLC CARBON NEUTRAL EFFECT

CLC tries best to improve existing bioplastics' disadvantages and re-establish the principle of the future of plastics. Our goal is to achieve carbon neutral and to provide solution for environmental pollution.

2.9kg
↓ ↓ ↓

GHG reduction

2.9kg CO₂/1kg reduction compare to existing petro-based plastics (Food grade).

1.464kg
↻

Carbon fixation

1.464kg Co₂/1kg fixation by using recycled biomass (Food grade).



Recycle

Every CLC products can be recycled.

CLC's Grade-Specific Characteristics

Sortation	CLC BASIC	CLC FOOD
Technology	Polymerization (Covalent bonding at the interface between heterogeneous substances)	
Bio-based Carbon content	29 ~ 55%	100%
Manufacturing method	natural polymer-synthetic polymer interface polymerization	interface polymerization between natural polymers
Feedstock	natural polymer 60~70% (wood powder, rice husk, corn flour, etc.) +30~40% olefinic polymer	100% natural polymer (wood powder, rice husk, corn flour, coffee grounds, beer grounds, etc.)
Strength	very strong, 120 degrees heat resistance, relatively cheap, reduce carbon emissions, solve the waste problem	
Application	cosmetics container (design concentrated product), glasses frame, 3D filament (no toxic), thread (eco-friendly), coffee capsule (no toxic) baby&kids products (eco-friendly&no toxic), daily supplies (food, storage box, tableware, kitchen, etc.), disposable containers, furniture (toxic MDF replacement) logistics materials (distribution pallets, food transport boxes, etc.), Electronics (monitor exterior material, flame retardant outlet, etc.), building materials (Deck, duct, plywood, ceiling material, etc.)	
Biodegradability	Naturally degradable*	Naturally degradable*
Decomposition period	10 ~ 30years · It is possible to adjust the decomposition period in nature or in a specific environment according to the application requirements ·	5 ~ 30years

Natural degradable (CLC's own concept)

Although it does not meet the biodegradation certification criteria (6 months, 90%), it is ultimately decomposed within an appropriate period of time (about 30 years ago) when discarded after use.

NATURE PROPERTY DEGRADATION PRICE

MANUFACTURING PROCESS FOR CLC

| Injection molding



Using existing mold

It can be manufactured in existing mold (May need some modification).



Efficient production time

It has similar production speed to conventional plastics.



Cost competitiveness

It has cost competitiveness to other bioplastics. Compare to conventional plastics, the price barrier is not high.



Various products

It can be applied to Cosmetics, living supplies, single use products, industrial, construction materials and etc.



Post-process

The post-processing and various designs that were possible with conventional plastics are available such as plating, printing, eco-friendly spray, anti-covid spray or UV coating.

| Extrusion molding



FRP level strength

It is applicable to special industrial fields (Electric car parts, etc) with FRP level strength.



FRP level heat resistance

It is applicable to special industrial fields (Electric car parts, etc) with FRP level heat resistance.



Application for various industrial fields

Since it is possible to realize carbon neutral, it is applicable to overall industrial fields as well as special industrial fields and construction.

CLC EXAMPLE OF APPLICATION

According to each product's need, various additional function can be added for optimum physical properties. (Post-processing like printing, plating, depositing on the surface, coating and etc., anti-bacterial, water resistance, alcohol resistance, strength and etc.).

Cosmetics



Necessities



In addition to
It can be applied to various products.



BABY / KIDS



KITCHEN



LIVING



ACCESSORY



OFFICE



ELECTRONIC



PET











TRANSPORT

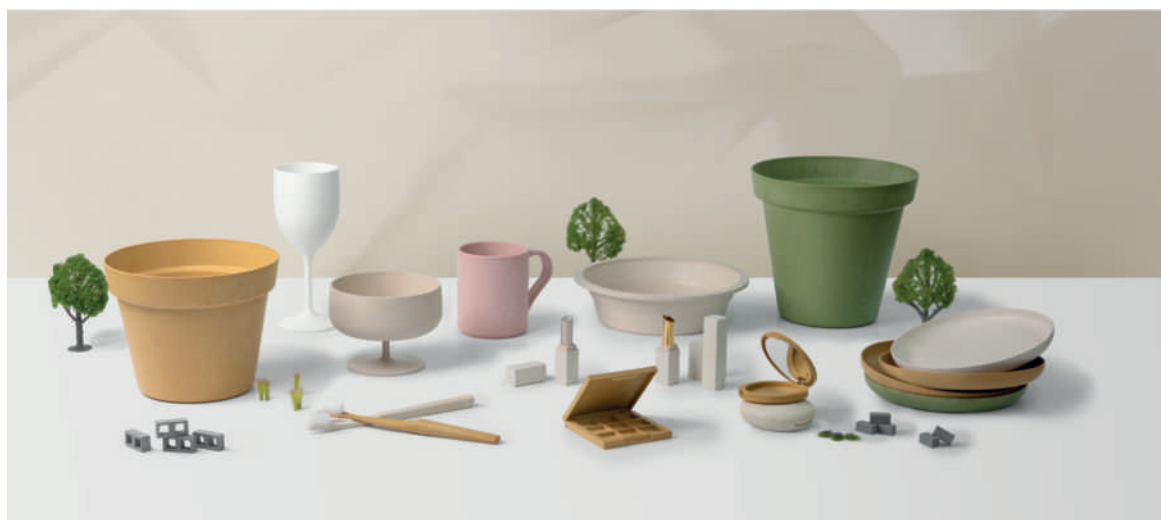


ARCHITECTURE

TYPES OF CLC

Grade	Main ingredient	Bio carbon content	Color	MI	Deodorize	Printable	
CLC-BSW-0	Wood powder	29~55%		15	X	X	
CLC-BSW-0HF	Wood powder		 Brown	30	X	X	
CLC-BSW-0HFE	Wood powder		 Brown	30	X	X	
CLC-BSW-1	Wood powder		 Bright Ivory	15	0	X	
CLC-BSW-12	Wood powder		 Bright Ivory	15	0	0	
CLC-BSC-12	Corn flour		 White	15	0	0	
CLC-FDW-12	Rice husk		99%~	 Bright Ivory	15	0	0
CLC-FDC-12	Corn flour			 White	15	0	0

Temperature 160 C~180 C, other injection pressure, Injection speed, etc. depends on the mold structure. As it is different, prior consultation is required for injection.



Q01. How to recycle CLC?

Unfortunately, there is no recycle standards for CLC. For now, CLC can be thrown out in regular garbage bag. We are working with Ministry of Environment to establish new recycle standards for CLC.

Q02. Is post-processing available?

Yes, it is.

Various post-processing can be done like printing, depositing on the surface, plating, spray or etc.

Q03. What is the meaning of bio based 100%?

It means that it is consists of 100% natural materials.

It also means no petro-based plastic is used at all since USDA certified as 100% natural carbon in CLC.

Q04. Is there any problem occur when contacted directly to cosmetics?

For now, it is recommended to use separate container in cosmetics applications.

Around Blue is continuously conducting chemical resistance/alcohol resistance test and doing R&D for eco-friendly coating for chemical resistance/alcohol resistance.

Please look forward to hearing the news in near future!

Q05. Is blow available?

CLC has been used low elongation raw materials such as wood flour, rice husks and etc. Thus, blow is currently not available but R&D is in process for blow by the end of the 2022.

Q06. Is transparency available?

Transparency is not available since it uses biomass (wood powder, rice husks, corn flour, etc).

Q07. What about the mechanical strength?

Mechanical strength is somewhere in the middle of PP and ABS.

Q08. What is the different injection conditions compare to petro-based plastics? What are concerns?

CLC can be injected between 160 ~ 185°C. Due to the nature of CLC, lots of gas is generated so that it is important to drain the gas and spray rust inhibitor to prevent corrosion. If CLC is injected with a mold that has been injected with other materials, sufficient purging is required. This is to prevent material mixing and is same to vice versa.

Q09. What about the shrink rate?

The shrink rate is about 5/1000.

However, in PP molds, it needs extra care because it shrink less which makes it stuck in molds.

Q10. Is it necessary to make molds only for CLC?

We highly recommend to make molds for CLC. Nevertheless, if the structure is not so complicated, it is OK with existing PP molds for sample testing. For mass production, the gate and gas drain need to be extended.

The best results comes from when the dedicated CLC molds used.

Around Blue Co., Ltd. is a company that produces bio-based plastic CLC (Cross Linked Cellulose) and eco-friendly products. Based on USDA certified 100% bio-based CLC, we are making various design inspired eco-friendly consumer products.



This brochure is an eco-friendly brochure made of uncoated craft paper and FSC certified paper.



www.aroundblue.net

**More information about CLC
and Around Blue.
Check out the homepage!**

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