

CarbonFiber Water Purification

# MiraCarbon®

For improvement of water environment and recovering rich ecosystem



## SO-EN CO.,LTD

# CarbonFiber Water Purification Mira Carbon®

CarbonFiber has great effects on water purification and alga bed formation



Water purification using CarbonFiber is economical and effective method. Active biofilm are formed by high bioaffinity of CarbonFiber, and microorganisms decompose contaminants.

In addition, aquatic plant can be easily implanted on CarbonFiber and it becomes a habitat of aquatic organism. Therefore, it functions as seaweed bed which is a raising environment for laying eggs or young fish.

## Water purification effect by CarbonFiber

The confirmed effects of CarbonFiber: the improvement of cleanness (SS) at short time, the significant reduction of COD and BOD, the purification of total nitrogen and total phosphorus.

### Applicable area

- Environment water (river · lake/marsh · pond water · seawater)
- City sewage (septic tank · advanced treatment tank)
- Organic industrial wastewater (food · sake-brewing · chemicals)
- Organic livestock wastewater (excrement · expression of milk)
- Residential/ Kitchen wastewater

### The benefits

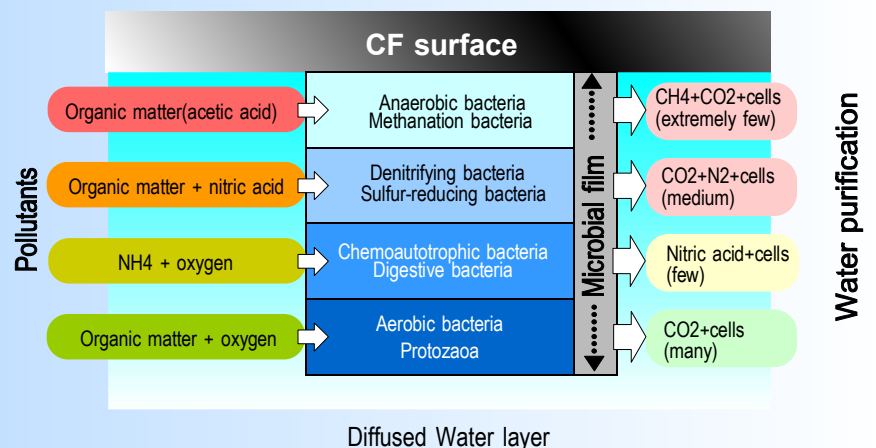
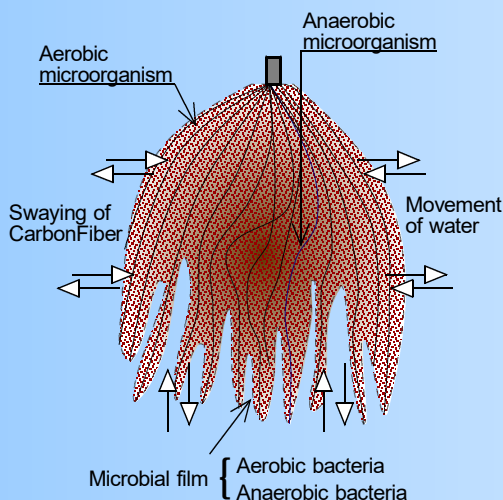
- The decomposition speed becomes fast by activated microorganisms
- Excess sludge is rarely emerged and hardly exfoliates
- The effect of the denitrification is high
- The effect of capturing suspended substances is high
- The low energy cost and environmental loading

Removal rate of water quality purification using CarbonFiber items (%)

Items		River	Lake	Sewage
B O D	Biological Oxygen Demand	50~70	20~90	90~95
S S	Suspended Solids	50~70	20~90	90~95
T N	Total Nitrogen	10~30	10~30	30~70
T P	Total Phosphorus	10~50	30~90	30~50
Chl-a			10~90	



## Mechanism of water purification



Swaying of the carbon fibers causes movement of the water and decomposition of pollutants.

Main nutrients and metabolism products of microorganisms in microbial film.

## What is CarbonFiber?

CarbonFiber is a fiber, consisting almost exclusively of carbon. PAN obtained by heat treatment of acrylic fiber is a fibriform carbon substrate, which has graphite crystal structure. Each carbon fiber bundles 12,000 of microscopic filaments, 7 micrometers in diameter. Because Carbon Fiber is "high specific strength and corrosion free" advanced functional materials, it has been applied in variety of uses. CarbonFiber using for water purification differs from industrial uses and is made special surface treatment.

## ●Feature of water purification material MiraCarbon

### 1. Light and strong (Mechanical characteristics)

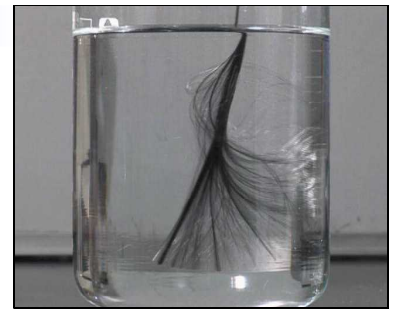
Since CarbonFiber is superior in specific strength and elastic modulus (specific rigidity) to vegetable fiber and synthetic fiber, it can keep linear shape in water and can sway with a small action of water.

### 2. High dimensional stability and heat resistance (Heat characteristics)

CarbonFiber has low heat expansion coefficient and high dimensional stability. Hence, even under every temperature, it is less likely to lose its mechanical characteristics.

### 3. Low electric resistance and high electrical conductivity (Electrical characteristics)

In addition to Low electric resistance, it has high electrical conductivity. Since electric charge is small, bacteria/microbes are easy to adhere and be activated without no barrier.



Spreading and movement of CarbonFiber.

## ●The point in water purification

1. Applicable water quality range, BOD: 5~600 ppm.

2. Suitable purification materials and its method of application.

①Tassel type (CFK-1, CFS-2) is suitable for calm flow or retained water.

②Textile type (CFH series), square-block type (CFK-4) is suitable for rapid or eddying flow.



Bio film ( radical sludge)

## ●The point in artificial algae bed formation

1. Various types of purification materials can be used in algae bed formation.

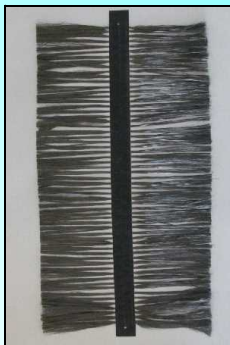
2. Due to high bioaffinity, CarbonFiber attracts fish, prawn, and shellfish, thus suitable for algae beds.



## ●MiraCarbon Standard Specification

### K series

#### CFK-1



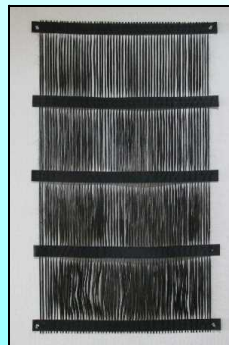
Length	65	cm
Unit Length	16	cm
Width	32	cm
Tassel Qty	120	Qty
FiberAmount	20	g

#### CFK-3



Length	65	cm
Unit Length	32	cm
Width	34	cm
Tassel Qty	60	Qty
FiberAmount	20	g

#### CFK-4



Length	100	cm
Unit Length	100	cm
Width	65	cm
Tassel Qty	60	Qty
FiberAmount	60	g

### H series

#### CFH-1



Length	65	cm
Unit Length	55	cm
BundleLength	10	cm
Width	15	cm
FiberAmount	40	g

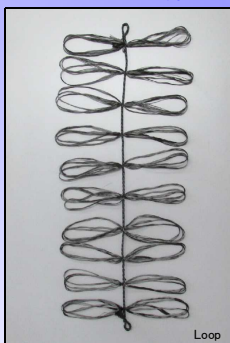
#### CFHK



Length	2, 3, 4	m
Unit Length		
BundleLength		
Width	15	cm
Fiber weight	75	g/m

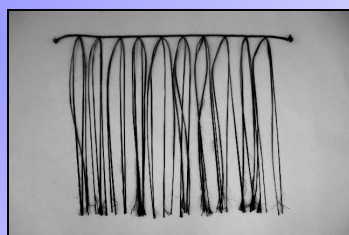
### S series

#### CFS-2 NewType



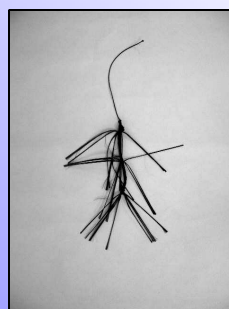
Length	70	cm
Unit Length	16	cm
Width	32	cm
Tassel Qty	60	Qty
FiberAmount	20	g

#### CFS-5



Length	55	cm
Unit Length	50	cm
Width	55	cm
Tassel Qty	40	Qty
FiberAmount	17	g

#### CFS-1



\*For aquarium, compact size pond

Length	15	cm
Unit Length	14	cm
Width	30	cm
Tassel Qty	24	Qty
FiberAmount	3	g

#### CFH-2



Length	100	cm
Width	100	cm
FiberAmount	400±10%	g/m²

\*Available special order Less than 100 cm Width × all length

\*Size of tolerance is ± 5 % \*This list shows MiraCarbon materials. Please go to installation method for actual installation.

\*Please note that the use, visual, and visual aspects of MiraCarbon can be changed for improvement without notices.



## ●Standard CarbonFiber Installation Methods (Water Purification/ Seaweed Bed Formation)

Method	Type	Attachment method	Purpose	Adaptive type
Hanging	Hanging with Rope	Type U installation Type I installation	Water Purification Seaweed bed formation	CFK-1 CFK-3 CFK-4 CFS-1 CFS-2 CFS-3 CFH-1 CFHK
	Rope Floating Unit	Length Connection Hanging with Rope Unit		
	Raft Hanging	Length Connection		
	Floating-Island Unit	Length Connection		
Floating	Float Unit	Bottom-fixing+floating with floats	Bottom Sediment Decomposition	CFH-2
	Frame Unit	Fixing with the steel		
Bottom-laying*	Frame Unit	Fixing with the steel	Bottom Sediment Decomposition	CFH-2
	Pile	Fixing with the steel-piles/ weights		
Floating & Bottom-laying	Frame Unit	Fixing with the steel-Frame Floating with floats	Water Purification Seaweed bed formation Bottom Sediment Decomposition	CFH-2 + all types

\* If only BOTTOM-LAYING is used, water purification is not achieved and the effect will be small; therefore, a combination of FLOATING + BOTTOM-LAYING or HANGING + BOTTOM-LAYING is effective.

### ●Installation

\* we provide various consulting support for water.

- Installation amount If you can provide data about water quality and sludge level, we will design optimum installation amount.
- Pilot plant We conduct pilot plant by the carbon fiber water purification materials
- Proposal of construction method We design suitable method depending on locational conditions, water environment, and economic efficiency.

### ●The installation amount of CarbonFiber

The Location	The Purpose	The amount g/m <sup>2</sup>
Lake/Marsh, Sea, River	Water Purification	10~100
River	Water Purification	100~200
Industrial waste Sewage	Water Purification	100~600
Lake/Marsh, Sea, River	Seaweed bed formation	10~200

\*This is a standard calculated through demonstration; Please decide the actual amount properly.

\*The amount depends on shape, depth, water quality, flow velocity, and residence time of the area.

## ●Safe handling of CarbonFibers

### 1. Cautions for handling

Touching or scratching CarbonFiber may damage it, which causes fluff, dust, and fly.

- ①Please don't scratch your skin even if you get itchy. Scratching might cause inflammation of your skin. Feeling itchy is usually temporal, and you won't feel itchy since the fibers pierced your skin are pulled out half a day later.
- ②Short circuit might occur if fly reaches inside of a switch or control instrument. Please don't handle the carbon fibers near electronic devices and PC.
- ③Please don't cut the textile CarbonFiber water purification materials, it goes to pieces.

### 2. First-aid treatment

- ①The fibers in the eye: If you are contact lens users, take out your contact lenses and bathe your eyes with clean running water for more than 15 minutes.
- ②The fibers on the skin: Wash off with soap and hot water/ water. Adhesive tapes are also useful.
- ③Inhalation: Get fresh air immediately and wash your mouth.
- ④Swallowing: Rinse out your mouth with a large amount of water. Please take a medical treatment if irritation is not relieved or you feel trouble in all above cases.

### 3. For the use as water purification materials

- ①At first when the materials are installed in contaminated water, contaminated substances and microorganisms are rapidly attached to it. Microorganisms then activate and steadily decompose contaminated substances.
- ②If the decomposition speed becomes slow by the attachment of excess sludge, please rinse off excess sludge from the materials and put them into the water.
- ③Please keep the materials wet condition to protect them from drying, when you temporally take the materials out of the contaminated water.
- ④You can use the materials for long-term if you keep them good condition because CarbonFiber neither deteriorates nor decomposes.
- ⑤When use them in swiftly flowing/swirling current area, their filament might be damaged.

### 4. Cautions for disposal

- ①Please distinguish waste and refuse from combustible materials and treat them as non-burnable wastes or industry waste.
- ②Please comply with a regulation if there is a code of local government.
- ③Landfill disposal is suitable for a method of waste disposal.
- ④Please don't incinerate the waste. CarbonFiber doesn't burn completely by an incinerator of general waste.

Please be sure to read it before you use our products.

◇Please note that specification, size, and appearance of CarbonFibers artificial seaweed may change to improve the quality without prior notice.

Cat.NO.E001 2019.01	<p>■ Manufacture</p> <p><b>so-en</b> think earth</p> <p><b>SO-EN CO.,LTD</b> 1665-1 Shinbo-machi Takaski Gunma Japan TEL +81-27-352-4857 FAX +81-27-352-4875 e-mail: soen.net@gmail.com URL <a href="http://so-en.net/index-e.html">http://so-en.net/index-e.html</a></p>
---------------------	---