# DLC Purified Water Co. Ltd

Milton Keynes England

## Technology DLC (Diamond-like carbon) treatment of polluted water with carbon nanomaterials

*Making the environment better, for the benefit of the future generations*

“

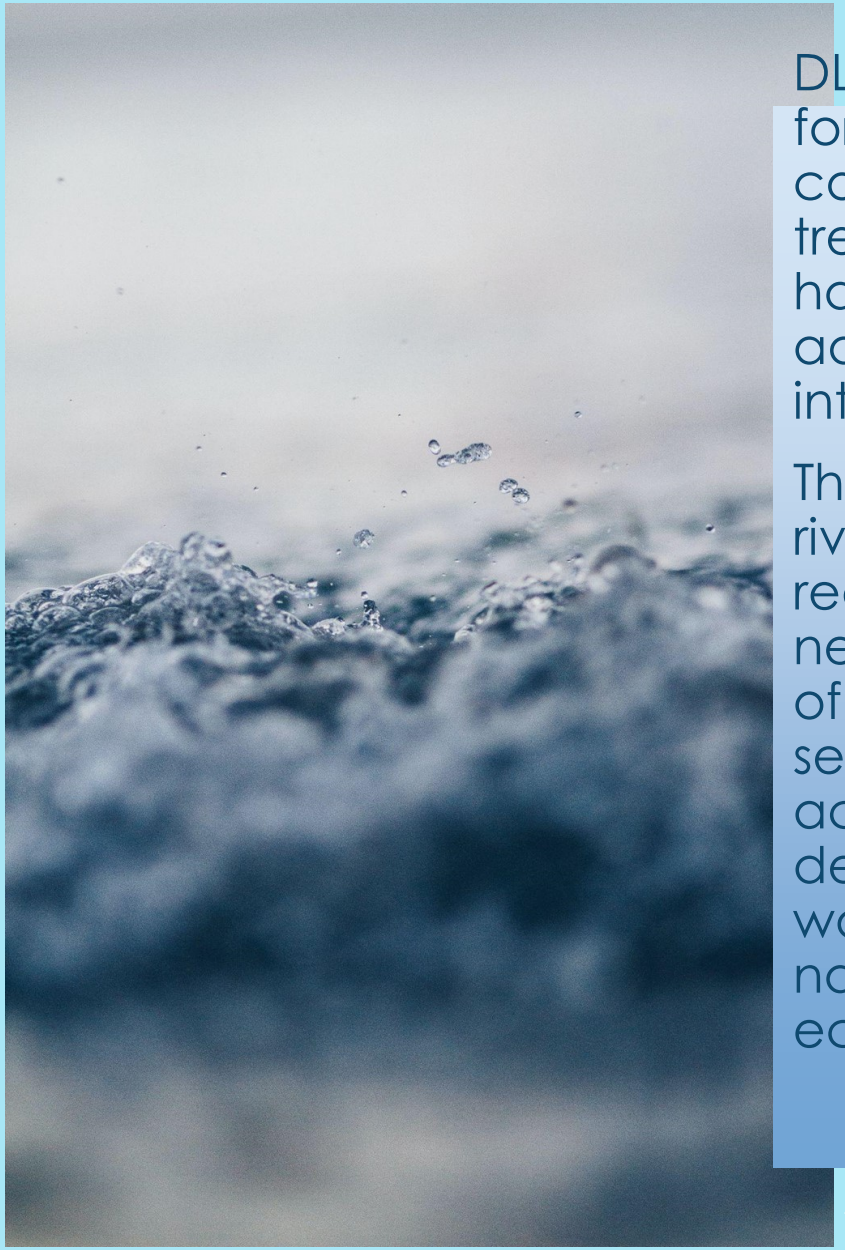
***Nanotechnology Treatment of Polluted Water***

The DLC Technology is based on the oxidizing and reduction characteristics of the carbon nanocomposites when under the action of the micro-current to effectively reduce:

- COD (Chemical Oxygen Demand),
- BOD (Biochemical Oxygen Demand),
- suspended solids,
- ammoniacal nitrogen,
- phosphorus

It also removes organic pollutants from the water, for example:

- Algal organisms
- Rancid organic substances in silt
- Benzene
- Phenol
- Ether
- Ketone and other organic substances



DLC technology makes up for the deficit of current conventional water treatment methods and has reached an advanced level in the international arena.

This water treatment of rivers and lakes does not require dredging, does not necessarily require the use of chemicals, creates zero secondary pollutants; achieves integrated decontamination of mud, water and restores the natural state of freshwater ecosystems.

# TECHNICAL FEATURES

**The technology has the following characteristics:**

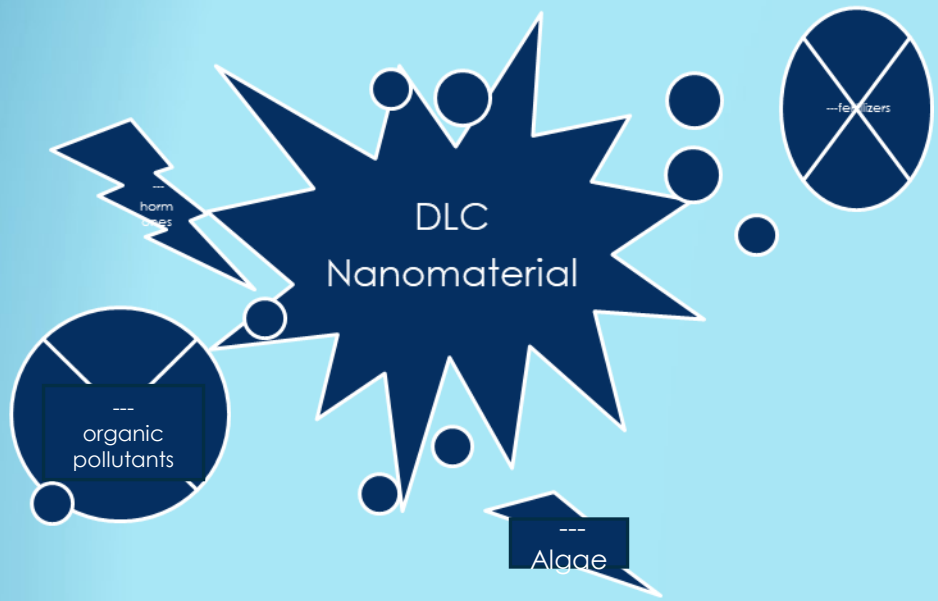
- Implementation is simple: the entire treatment and restoration process does not require any biochemicals, large-scale civil engineering projects, or filtration engineering.

The equipment occupies a small area, has a low energy consumption, and as a result, it can self-feed.

- The treatment has a vast impact, the effective treatment range is 300 ~ 500m, and the action range can reach 1000m; even the neighboring waters can be treated to a certain extent, there is coverage downstream and traceability upstream, suitable for the management of the entire catchment area;
- Integrated treatment of water, sediment and air, saving on the costs of removing polluted bottom mud;

# TECHNICAL FEATURES

An accurate treatment against chemical fertilizers, hormones, organic pollutants, unicellular algae, viruses, bacteria, heavy metals, acid radical ions, etc. All these substances can be broken down into harmless natural minerals; pollutants in the sediment can be decomposed according to the water solubility of the pollutants;




The repair is completed, the treated water body will quickly restore its normal activity. with dissolved oxygen, the water will quickly reach a natural and clean state.

The entire treatment process is non-toxic and non-polluting, harmless to animals and aquatic plants. At the same time it restores the self-purification capacity of the environment, restores the growth of indigenous microorganisms in the water, promotes the reconstruction of biological chains and the restoration of ecosystems.

## THE PRINCIPLE OF THE TECHNOLOGY

Immerse the equipment with super-strong carbon nanomaterial in water. The material can deconstruct water molecules in the ionized state to produce super strong oxidation groups in atomic state H and atomic state O, catalytic action, rapid diffusion and chain reaction are produced in the water body.

After encountering algae or single-celled bacteria in the water body, it will quickly penetrate the cell membrane of the single-celled algae or bacteria and cause an irreversible oxidation reaction with cell enzymes and consequently cell death, but does not create damage to other organisms in the water body.

The super oxidant group produced in this process meets other organic waste in the water body, induces a strong redox reaction purifying the water body to achieve the treatment purpose i.e. ecological restoration.

# 1. DEODORIZATION MECHANISM

- The smell produced by wastewater generally includes fishy smell, ammonia smell, rotten meat smell, rotten egg smell, rotten cabbage smell, manure smell, and some special wastewater odours.
- The components of odour at the wastewater treatment site are divided into three categories:
- ①Sulfur-containing compounds, such as H2S, mercaptans, thioethers;
- ② Nitrogen compounds, such as ammonia, amines, amides, indole, etc.;
- ③Organic substances containing oxygen, such as alcohols, phenols, aldehydes, ketones, organic acids, etc.
- Among them, H2S (hydrogen sulfide) and NH3 (ammonia) are the main components of the odour.

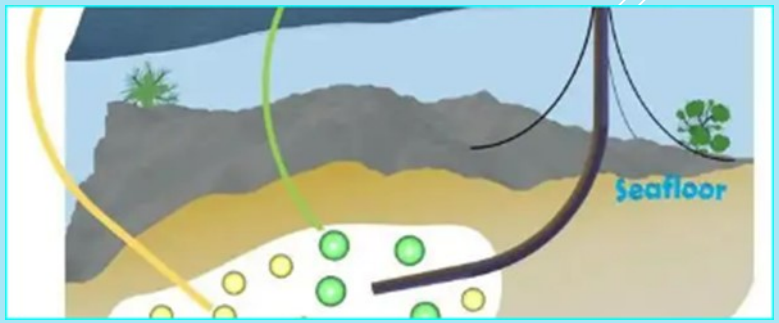
- When the TRC-X device is turned on in the water body, it produces super oxidizing, **monoatomic H** and **monoatomic O** groups. Decomposes foul-smelling substances into **CO2, H2O and H2SO4** or partially oxidizes and reduces compounds to normal temperature and pressure.
- Latomico **H** and **CO2** will deconstruct and disperse the odor-producing molecules emitted into the air. Dissolved oxygen reaches a supersaturation of 15-20 mg / L within three to five days and pollutants such as ammonia **nitrogen** and **hydrogen sulfide** in the water are rapidly oxidized to eliminate bad odors. Subsequently, the dissolved oxygen will return to the normal state of 5-10 mg / L.

## 2. Mechanism of discoloration

▶In the electric field, after the two ends of atom C have been repolarized, we will have the formation of innumerable electrolytic micro cells. The macromolecules of the pigment directly undergo redox at the ends of the particles. At the same time, oxygen containing functional groups on the surface of C atoms have a special catalytic effect and could shift the electron cloud distribution of the absorbed chromophore group, and, cause the molecular structure of the chromophore group to be in a state activated unstable. Through electro-oxidation organic free radicals are generated, which are oxidized and degraded by hydroxyl radicals.

## 3. Algae removal mechanism

▶The super oxidant group generated, under the action of photocatalysis, will rapidly penetrate the cell membrane of algae or unicellular bacteria, will cause an irreversible oxidation reaction with cellular enzymes, resulting in cell death thus achieving the purpose of removing unicellular bacteria and algae.



## 4. Sludge removal mechanism

- The **super oxidizing groups** and the **mono atom O**, the **mono atom H**, when they meet other organic substances in the water and sediments, induce strong **redox reactions** and decomposition reactions, they deconstruct their molecular chains and degrade them into **CO2** and **H2O**, achieving the purpose of treatment.

## 5. Mechanism of degradation of Nitrophenol

- The hydroxyl radicals generated by the decomposition of H2O are transferred near the electrode surface and directly attack the para-substituted phenol. Under the attack of the hydroxyl radical, the para-substituent is removed from the benzene ring.
- The group of electrons transfers the charge on the benzene ring to the C atom in the para position. Under the attack of the hydroxyl radical, the electron-picking group is removed from the para position and the para-substituted phenol is degraded. So toxic substances as nitrophenol in water bodies will be removed.

## 6. Mechanism of ammonia nitrogen removal

- The removal of ammonia nitrogen occurs mainly through
- direct oxidation and indirect ClO- oxidation.

$$2NH_4^+ + 6OH^- = N_2 + 6H_2O + 2H^+ + 6e^-$$

$$2NH_4^+ + 3HClO = N_2 + 3H_2O + 5H^+ + 3Cl^-$$

$$2NH_4^+ + 3ClO^- = N_2 + 3H_2O + 2H^+ + 3Cl^-$$

## 7. Mechanism of phosphorus removal

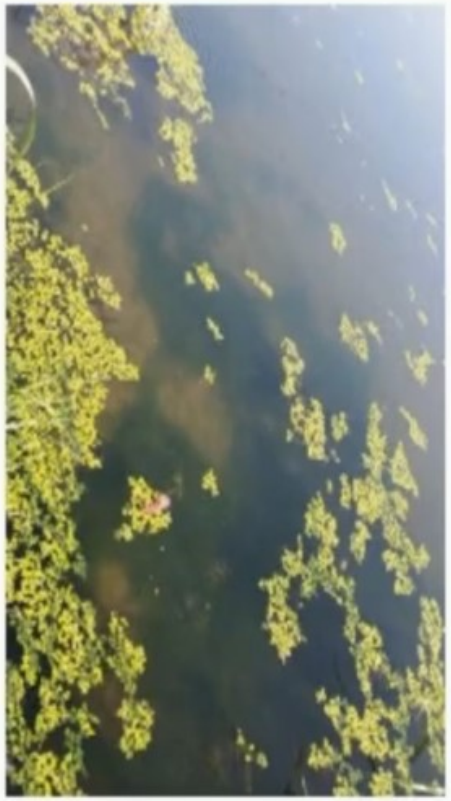
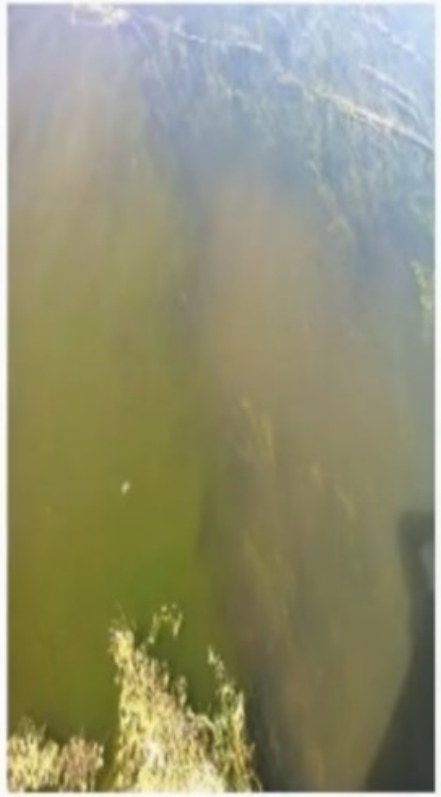
- Part of the organic phosphorus is reduced to phosphine and escapes, part of the phosphorus is oxidized to phosphate, which is absorbed by the plants.

## 8. Mechanism of heavy metal ions removal

- The technology is based on the strong reduction of atomic hydrogen to reduce or passivate heavy metal ions into elementary metals, which come enriched and precipitated.

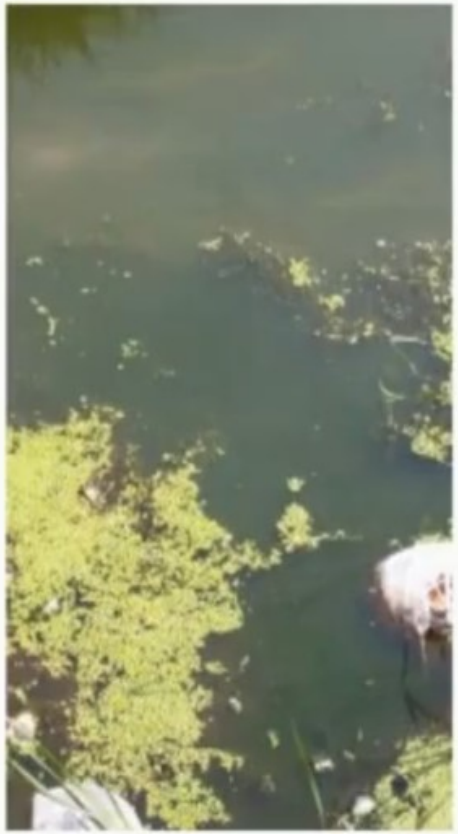
# Case Study Results: Baoding North Lake, Hebei, Province, China




# Case Study Results: Baoding North Lake, Hebei, Province, China

# Case Study Results: Baoding North Lake, Hebei, Province, China


# Case Study Results: Baoding North Lake, Hebei, Province, China

## Before Treatment

- The water had a COD value of 227mg/L
- This pollution was causing plant growth to deteriorate greatly, reducing the biodiversity of the lake.
- A great deal of nitrogen and phosphorus could be detected.
- The water is entirely opaque and many locals complain of the foul smelling lake.

## After Treatment

- The COD value was reduced to 7 mg/L
- Nitrogen and Phosphorus quantities were reduced by 96% and 82% respectively.
- Transparency has returned, more than 1 metre below the surface is now visible.
- The stench is gone and flower growth has become healthy once more.

DLC Purified Water Co. Ltd
Milton Keynes England

www.dlcwater.co.uk
Phone: 07590 045032
Email: info@dlcwater.co.uk