



## Bioremediation for Clean Water

Water can become contaminated with many organics, ammonia and other compounds that use up oxygen and create unhealthy water conditions and unpleasant odors. To clean water of these undesirable contaminants, bacteria and oxygen are required in sufficient amounts to oxidize or breakdown contaminants.

**Bacteria** are essential for natural recycling of nutrients throughout the environment and they can biologically maintain healthy water. Bacteria can break down nitrogen, carbon, and even biologically incorporate phosphorus. This is nature's way to control contaminants, and for a normal environment, existing bacteria can be sufficient; however, excess contaminants, such as ammonia and organics, such as proteins, oils, pathogens and other organics exist, or when oxygen is low, water quality suffers and treatment with supplemental bacteria can provide extra help needed. Often, special blends of bacteria are used to treat a broad array of contaminants to clean water faster.

**Bio-Lair Product** allows large colonies of bacteria to co-exist and thrive on its high surface area. It is an ideal substrate for bacteria to reproduce and much higher than other products.

As seen in the Table, Bio-Lair is a very high surface material for colonization of bacteria. This creates much higher bacteria concentrations in surrounding water used to break down contaminants. One study had 18,000 mg/L of bacteria in water away from Bio-Lair, as compared to 2000 mg/L normally present. Since bacteria break down contaminants, it makes sense that higher concentration accelerates cleaning of water. It also means less product needed. One Kg of Bio-Lair provides area of >4000 Kg plastic.

Product	Surface Area m <sup>2</sup> /m <sup>3</sup>
<b>BIO-Lair</b>	<b>&gt;2,500,000</b>
Spirox	82,000
Urethane foam, 5cm cubes	13,173
Fluidized Sand Bed	1,500
Polyethylene Beads	400
Kaldnes	260
Shredded Plastic Ribbon	250
1" BioBalls	160
Bio-Strata Blocks	110
Plastic Barrels	64

Bio-Lair is a highly porous ceramic product available in many shapes to provide flexibility for use in water cleaning systems. Water easily flows through the product. It can be packaged in durable plastic or nets for suspension in dirty water. It has a long life, does not release harmful chemicals and can be cleaned, if needed. Example shown in photo.



To treat a broad range of contaminants, MetaMateria recommends use with Bio-Lair of an environmentally safe bacteria blend containing four types of enzymatic *Bacillus bacteria* and *pseudomonas bacteria* that supplement naturally occurring bacteria in water. These bacteria will out-compete algae for nutrients and keep algae blooms from forming. These bacteria are effective will work at lower temperatures in the treatment of sludge, organics and other contaminants, even in low dissolved oxygen.

### **Bio-Lair + Bacteria + Oxygen**

- Bacteria multiply rapidly on submerged Bio-Lair
- Environmentally safe formulation of non-pathogenic bacteria
- Control of nitrogen compounds (ammonia, nitrite, nitrate)
- Excess biomass does not clog porous Bio-Lair product under normal operating conditions
- Cleaner, healthy water and control of algae
- Cost Effective

### ***For additional information:***

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