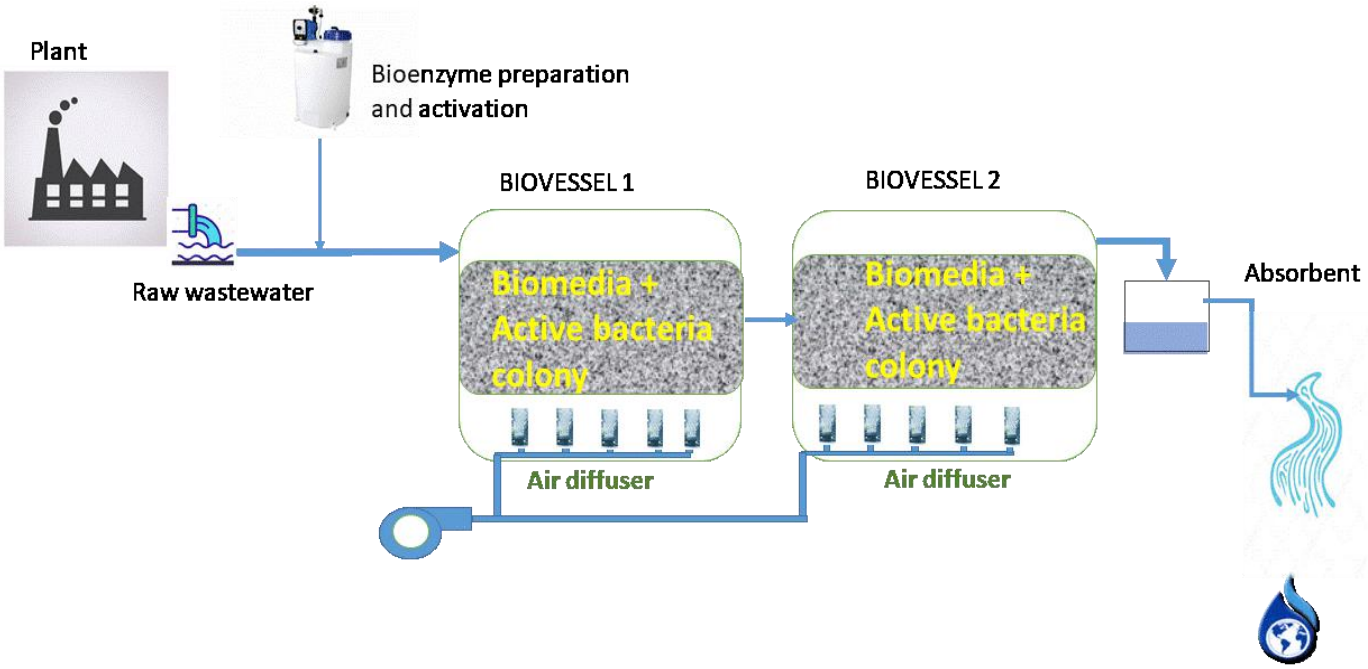
BLUE E TECH SDN BHD (778990-D)

ROOTS

ROOTS (Revolutionary Organic Onsite Treatment System) is a biological wastewater treatment system which is a combination of SB2L microbial bioenzyme, biomedia, air diffusers, absorbent and active bacteria colony.

This system functions very well to remove with very high efficiency all types of organic components present in all types of wastewater.

ROOTS TYPICAL LAYOUT



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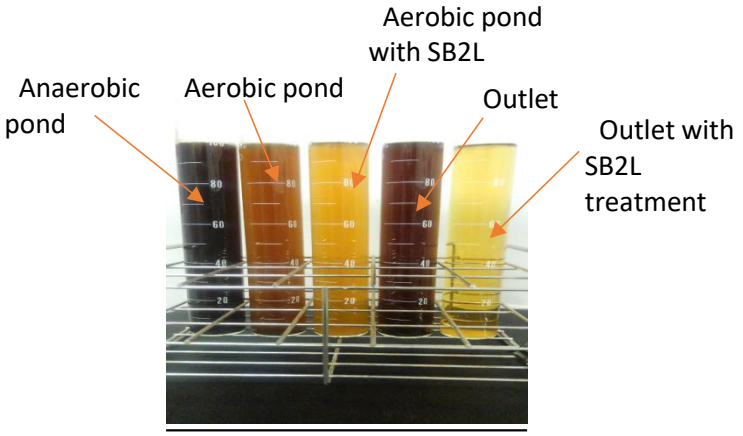
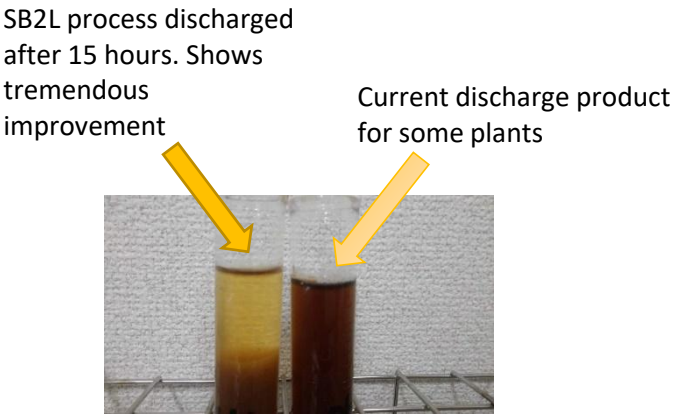
SB2L Microbial Enzyme

SB2L microbial enzyme is especially cultured bacterial enzyme that contain various enzyme to break down fat, oil & grease, starch, protein and other organic material.

The enzymes consists of lipase to break oil, fat and grease, amylase to break starch and protease to break protein.



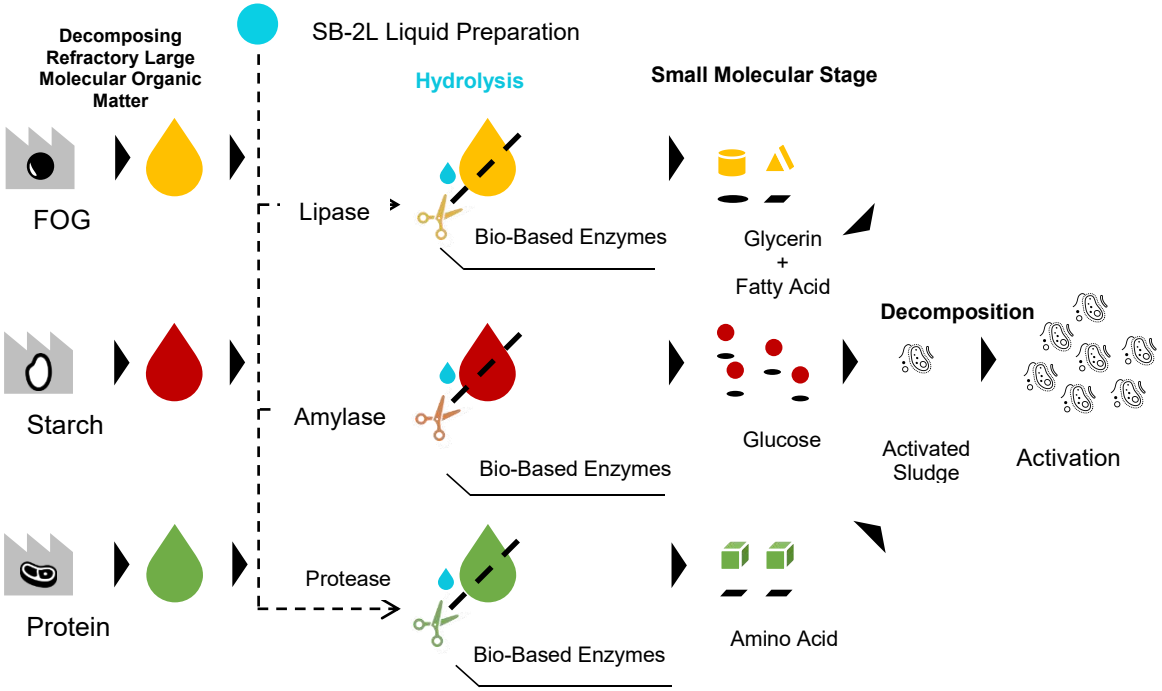
Batch treatment results using SB2L system for Palm Oil Mill Effluent at various treatment pond



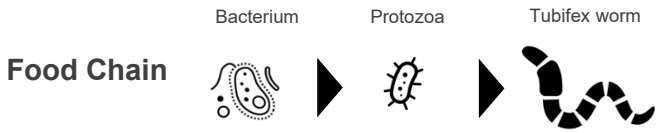
Palm Oil Mill Effluent treatment

Special features of SB2L microbial enzyme

1. Easily breaks down refractory compounds (hard to biologically digest type compounds) such as fat, oil and grease at process upstream. This will accelerate and improve biological wastewater treatment efficiency at downstream.



2. Reduces sludge generation significantly for wastewater treatment system up to two third from existing amount. At some treatment system, sludge handling is no longer necessary. This is possible due to presence of Small Tubifex worm in the food chain that digest the sludge.



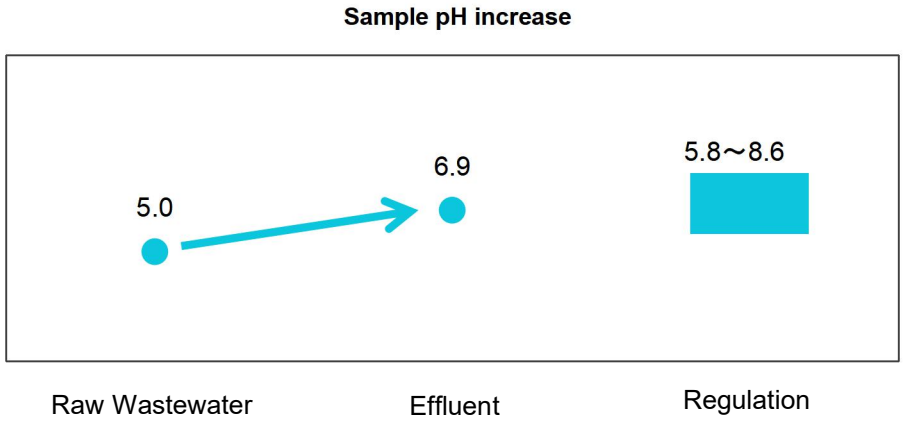
3. Accepts high BOD loading of 1 kg/m3 wastewater or more when used in combination with biomedia vessel compared to conventional system 0.5 kg/m3

4. Able to process MLSS (Mixed liquor suspend solids) at 5000 ~ 10000 mg/L using contact aeration compared to 2000 to 5000 mg/L for conventional activated sludge

5. Can work without problem for shock and unstable BOD loads. This is possible because the interior of biosphere in biofilm varies with bacterium, protozoa, Tubifex worm, etc

6. Low running cost due to saving from less sludge handling, lower energy consumption and easier maintenance. Only a very low dosage of SB2L is required. Normally between 1 to 10 ppm

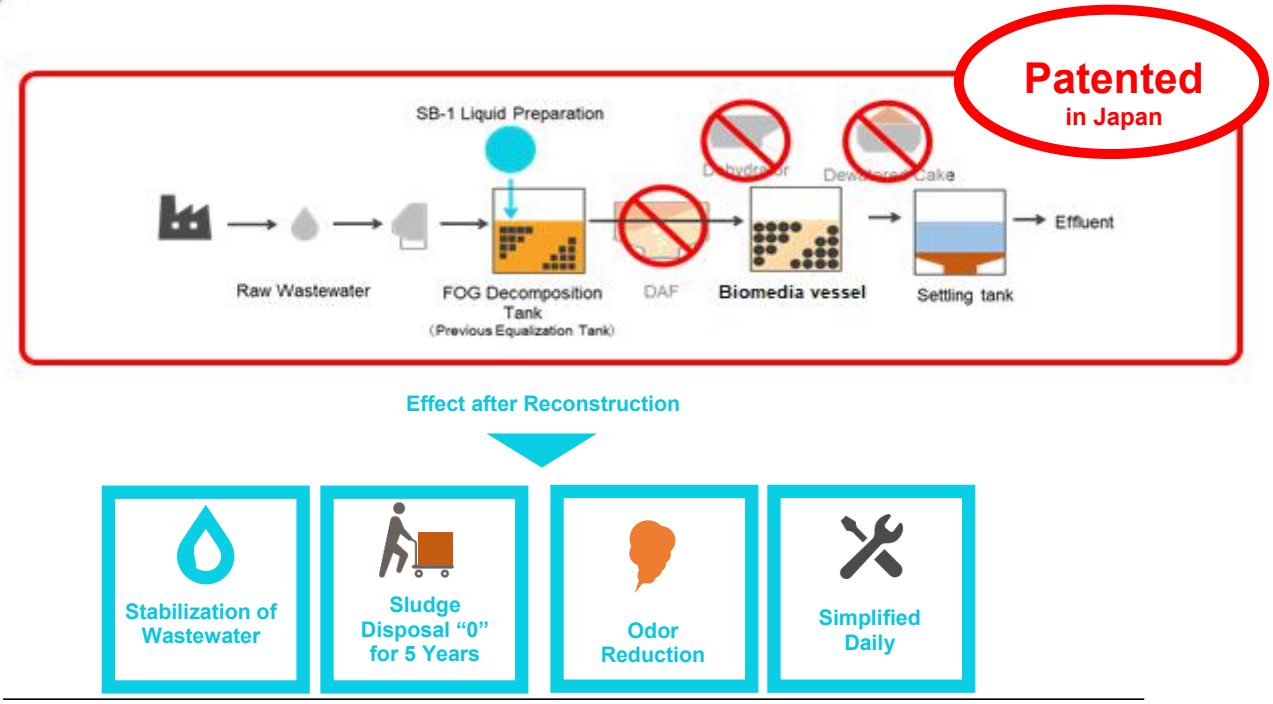
7. Increase pH naturally. This saves addition of chemicals for pH correction



8. Eliminates odour from process tanks

9. Dissolved air flotation (DAF) system can be removed

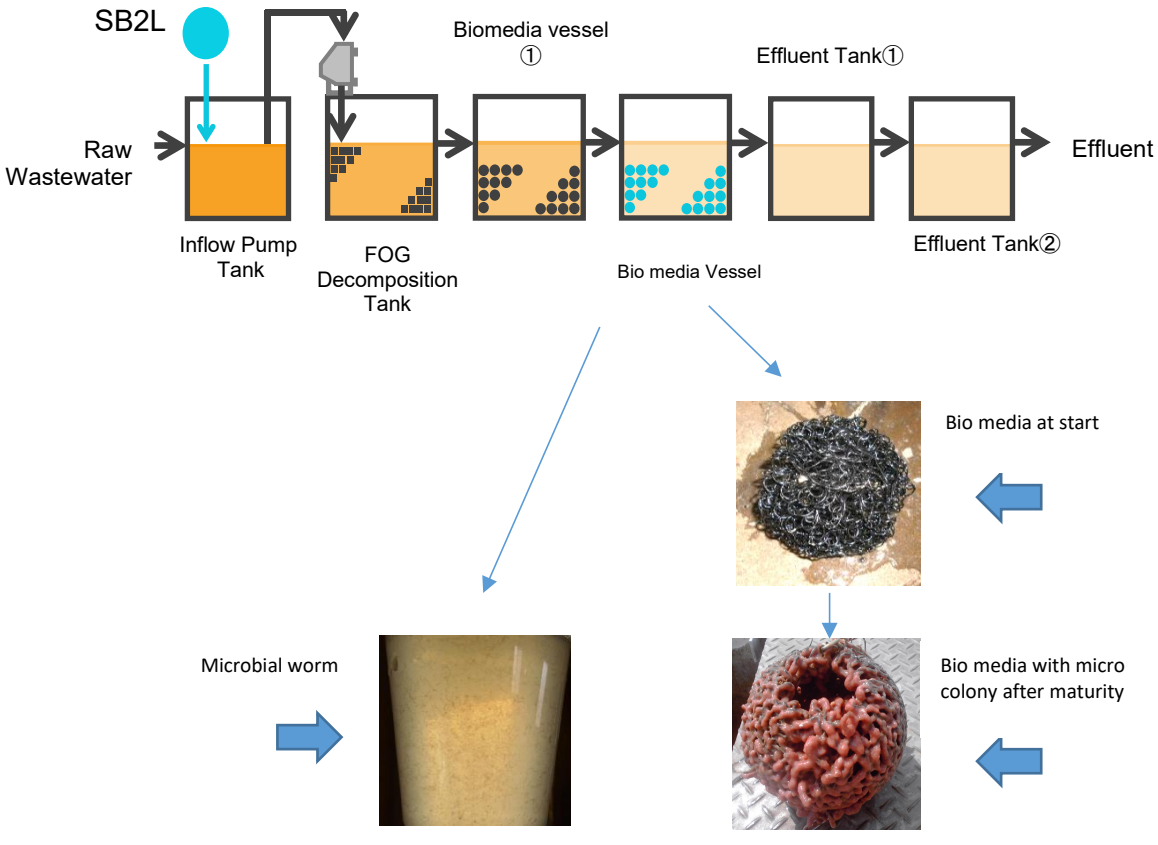
10. Existing wastewater treatment system could also be retrofitted with SB2 Ex system to improve treatment efficiency



11. Eliminates oil contaminated soil with direct dosage for specialized usage

Biomedia vessel for SB2L microbial enzyme

Biomedia vessel provides an ideal condition for SB2L system. In this system, biomedia acts as growth media for microbes instead of suspended in the wastewater. A typical arrangement of biomedia vessel is shown below



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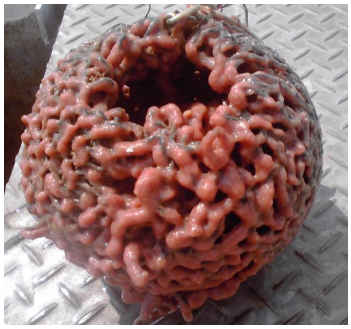
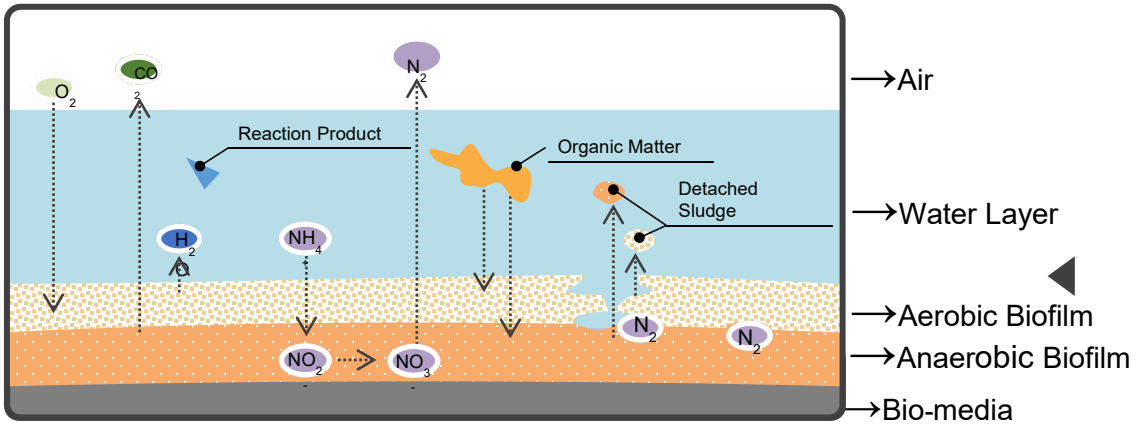
Bacterial colony across biomedia cross section



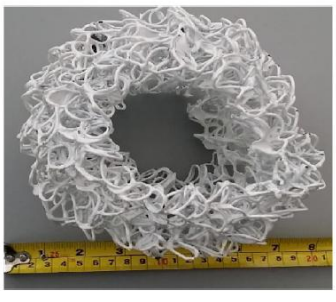


SB2L & BIOMEDIA PICTURES

SB-2L are packed in 1 Liter and 20Liter package. The dosing can be done manually or automatically.

SB-2L 1 Liter packaging

In contact aeration (MBBR) system, biomedia are provided as growth media for SB-2L and activated sludge. This media allows for quick increase of bacterial colony when BOD loading increases. Pictures of some BIOMEDIA samples shown below.



BALL SHAPE BIOMEDIA

Float glass biomedia

Sinking glass biomedia

Sponge glass biomedia

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ROOTS application track record

Wastewater type		BOD mg/L	SS mg/L	FOG mg/L	pH	Final discharge Destination	Volume m3/D	Retention Day
Soup	Raw	3200	300	150	5	River	600	2.2
	Treated	36	37	1	6			
	Removal %	98.9	87.7	99.3				
Cake	Raw	570	140	75	5	River	120	2.8
	Treated	4.7	13	1	7			
	Removal %	99.2	90.7	98.6				
Food Processing	Raw	1400	1000	110	6	River	60	4.2
	Treated	19	21	2	7			
	Removal %	98.6	97.9	93.9				
Food Processing	Raw	1800	260	480	4	River	500	1.2
	Treated	79	27	1	7			
	Removal %	95.6	89.6	99.1				
Rice	Raw	2300	2100	480	7	Sewage	200	1
	Treated	18-0	180	17	7			
	Removal %	92.1	91.4	95.4				
Rice	Raw	970	650	91	4	Sewage	60	3.7
	Treated	46	95	1	7			
	Removal %	95.3	85.4	98.9				
Fish Processing	Raw	800	300	150	5.5	River	50	2
	Treated	34	20	1	7.5			
	Removal %	95.8	93.3	93.3				
	Treated	130	1.5	1	7			
	Removal %	91.3	91.3	99.7				
Bento Processing	Raw	1500	1000	9	6	River	120	2
	Treated	9	6	1	7			
	Removal %	99.4	99.4	83.9				

Palm oil batch Test result (72 hours)

Parameter	Unit	Raw waste water	Treated waste water	Processing rate
pH		4.3	6.7	+2.4
BOD	mg/L	21000	4500	Δ79%
COD	mg/L	50000	5500	Δ89%
TSS	mg/L	29000	1600	Δ94%
FOG	mg/L	7600	330	Δ96%
T-N	mg/L	860	200	Δ77%
T-P	mg/L	210	82	Δ61%

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ROOTS Test result on Palm Oil Mill Waste water treatment plant

Wastewater parameter	New POME effluent discharge standard to comply (effective 2020)	Value BEFORE installation of ROOTS system at FP4 (Oct 2018 report from Client)	*Value achieved AFTER using ROOTS system at Final FP4 (Refer to 3rd party lab report dated 29th Feb attached)
BOD	20 mg/L	**55 mg/L**	**8 mg/L**
SS (Suspended solids)	50 mg/L	**4204 mg/L**	**23 mg/L**
AN (Ammoniacal nitrogen)	20 mg/L	**23 mg/L**	**5 mg/L**
TN (Total nitrogen)	200 mg/L	**49 mg/L**	**12 mg/L**
O & G	20 mg/L	**15 mg/L**	**6 mg/L**
pH	5-9	**8.9**	**8.5**
Temperature	<45 ^{0}C	**30 ^{0}C**	**29 ^{0}C**

Batch test and pilot plant

In order to check the actual performance of the ROOTS for any given wastewater treatment plant, we could do a batch lab test and pilot plant test at site.

A typical pilot plant is shown below

The pilot plant can be installed at an existing wastewater treatment plant for a given test duration. All the process parameters will be monitored and recorded. Once these records are studied, a suitable plant can be proposed to meet client's requirement.