Claims

1. A toxicant monitoring system for continuously monitoring level of a toxicant in wastewater comprising:

- a microbial electrochemical sensor;
- an electrical sensor electrically coupled to the microbial electrochemical sensor, the electrical sensor configured to measure at least one measurement of voltage, current, power, or hydrogen produced, wherein a drop in the measurement correlates to the presence of a toxicant;
- a process controller in communication with the electrical sensor, the process controller configured to execute instructions for monitoring the level of the toxicant in the wastewater, wherein the process controller is in further communication with an auto-sampler and a telecommunication system, the auto-sampler configured to collect a sample from the wastewater when triggered, and the telecommunication system configured to generate a notification when triggered;
- an input port configured to provide fuel and wastewater to the microbial electrochemical sensor;
- an output port configured to receive the wastewater after the wastewater contacts the microbial electrochemical sensor; and
- a feed recirculation arrangement comprising a level sensor, the level sensor in communication with the process controller, the level sensor configured to send a signal to the process controller when the level sensor detects low or no wastewater flow to the input port, thereby triggering fuel or wastewater to flow to the input port, wherein wastewater received at the output port is channelled to the input port.

2. The system according to claim 1, further comprising a first reservoir fluidly coupled to the input port, the first reservoir comprising the fuel.

3. The system according to claim 2, wherein the fuel comprises a source of organics.

4. The system according to any preceding claim, further comprising a second reservoir fluidly coupled to the input port, the second reservoir comprising the wastewater.

5. The system according to claim 4, further comprising a third reservoir fluidly coupled to the output port, the third reservoir comprising the wastewater which has contacted the microbial electrochemical sensor.

6. The system according to any of claims 2-5, further comprising a first flow control device fluidly coupled to the input port, the first flow control device configured to adjust flow of the fuel from the first reservoir to the input port.

7. The system according to any of claims 4-6, further comprising a second flow control device fluidly coupled to the input port, the second flow control device configured to adjust a flow of the wastewater from the second reservoir to the input port.

8. The system according to claim 5, wherein the third reservoir is fluidly coupled to the second reservoir via a third flow control device, the third flow control device configured to adjust a flow of the wastewater from the third reservoir to the second reservoir.

9. The system according to claim 8, wherein the process controller is further in communication with at least one of the first flow control device, the second flow control device and the third flow control device.

10. The system according to any preceding claim, wherein the microbial electrochemical sensor comprises an anode and a cathode, the anode comprising microbes.

11. The system according to claim 10, wherein the microbe comprised in the anode is in the form of a biofilm.

12. The system according to any preceding claim, wherein the microbial electrochemical sensor comprises at least a microbial fuel cell or microbial electrolysis cell.

13. The system according to any of claims 4-12, wherein the level sensor is comprised in the second reservoir and in communication with the process controller.

14. The system according to claim 12, wherein the microbial electrochemical sensor comprises at least two microbial fuel cells or microbial electrolysis cells.

15. The system according to claim 1, further comprising a pH probe and/or an oxidation-reduction potential (ORP) probe configured to measure pH and ORP, respectively, of the wastewater.

16. The system according to claim 1, wherein the process controller is embedded with an algorithm, the algorithm configured to determine whether to trigger the auto-sampler and/or the telecommunication system.

17. The system according to claim 16, wherein the algorithm is configured to determine whether to trigger the auto-sampler and/or the telecommunication system based on at least one of:

- measurements by the electrical sensor;
- pH measurements by a pH probe; and
- ORP measurements by a ORP probe.