Claims

1. An organic waste treatment system comprising:
   - an inlet for receiving organic waste;
   - a crusher coupled to the inlet for reducing the size of the organic waste;
   - a pre-treatment chamber for pre-treating the organic waste, the pre-treatment chamber comprising a heat exchanging unit and a pre-heating unit; and
   - a carbonization chamber for treating the pre-treated organic waste to form biochar,

wherein the system comprises three heating zones for stage-wise heating of the organic waste, the three heating zones comprising the heat exchanging unit, the pre-heating unit and the carbonization chamber.

2. The system according to claim 1, wherein the three heating zones comprise a heat exchanging unit for heat exchange at a temperature of 80-100°C, a pre-heating unit for heating the organic waste at a temperature of 100-320°C and the carbonization chamber for torrefaction of the organic waste at a temperature of 280-450°C.

3. The system according to claim 1 or 2, further comprising a collection chamber for collecting the formed biochar.

4. The system according to claim 3, further comprising a heat exchanger between the pre-treatment chamber and the collection chamber.

5. The system according to any preceding claim, wherein the carbonization chamber comprises an inlet for receiving an additive.

6. The system according to claim 5, wherein the additive is an inert gas.

7. The system according to claim 5 or 6, wherein the additive is nitrogen gas, argon, helium gas, or a combination thereof.

8. The system according to any preceding claim, further comprising a heat source for heating gas comprised in the carbonization chamber and the pre-heating unit.

9. The system according to any preceding claim, further comprising a separator at the inlet, the separator configured to separate metal from the organic waste received through the inlet.

10. The system according to any preceding claim, further comprising a conveyor configured to move organic waste received from the inlet through the pre-treatment chamber and the carbonization chamber.

11. The system according to claim 10, further comprising a temperature controller configured to measure temperatures of the pre-treatment chamber and the carbonization chamber and adjust speed of the conveyor.

12. The system according to any preceding claim, wherein the crusher comprises a seal to prevent any odour from the organic waste from escaping into the atmosphere.

13. The system according to any preceding claim, further comprising a waste liquid collection chamber in fluid communication with the crusher for collecting waste liquid from the crusher.

14. The system according to claim 13, wherein the waste liquid collection chamber comprises a liquid filtration system for treating waste liquid.

15. The system according to any of claims 3 to 14, further comprising a flue gas treatment system in fluid communication with the collection chamber for treating flue gas from the carbonization chamber.

16. A method of treating organic waste using the system according to any preceding claim.

17. A method of treating organic waste, the method comprising:

- providing organic waste to a crusher through an inlet;

- crushing the organic waste to reduce size of the organic waste;
- heating the organic waste to increase temperature of the organic waste; and
- torrefying the organic waste to form biochar,

wherein the heating comprises two stage-wise heating of the organic waste prior to a third heating during the torrefying.

18. The method according to claim 17, wherein the stage-wise heating comprises a first heating at a temperature of 80-100°C, a second heating at a temperature of 100-320°C and the torrefying comprises torrefying at a temperature of 280-450°C.

19. The method according to claim 17 or 18, wherein the torrefying comprises torrefying the organic waste in presence of an inert gas.

20. The method according to any of claims 17 to 19, further comprising separating metal from the organic waste received through the inlet prior to the crushing.

21. The method according to any of claims 17 to 20, further comprising treating waste liquid obtained from the crushing in a liquid filtration system.

22. The method according to any of claims 17 to 21, further comprising treating flue gas produced during the torrefying.