CLAIMS

1. A method for producing an L-lactate salt from a combined recycling of polylactic acid (PLA) waste and recycling of organic waste, the method comprising the steps of:
   (a) hydrolyzing PLA waste comprising poly-L-lactic acid (PLLA), poly-D-lactic acid (PDLA), poly (D-L-)-lactic acid (PDLLA), stereocomplex PLA (sc-PLA) or a combination thereof with a metal oxide or a hydroxide to obtain a PLA hydrolysis slurry comprising L- lactate monomers and a first counterion;
   (b) fermenting organic waste comprising carbohydrates and selected from a group consisting of food waste, organic fraction of municipal waste, agricultural waste, plant material, and a combination thereof with a lactic acid-producing microorganism in a fermenter in the presence of an alkaline compound to obtain a fermentation broth comprising L- lactate monomers and a second counterion,
   wherein the first and second counterions are the same; or wherein at least one of the first and second counterions is subjected to ion exchange thereby obtaining a first and second counterions which are the same;
   (c) optionally contacting the PLA hydrolysis slurry of step (a), the fermentation broth of step (b), or a mixture comprising the PLA hydrolysis slurry of step (a) and the fermentation broth of step (b) with a D-lactic acid degrading enzyme or a D-lactic acid-utilizing microorganism to eliminate D-lactate monomers thereby obtaining L-lactate monomers; and
   (d) purifying a mixture comprising the PLA hydrolysis slurry of step (a) and the fermentation broth of step (b) or the L-lactate monomers of step (c) thereby obtaining an L-lactate salt.

2. The method of claim 1, wherein step (a) and step (b) are performed in any order or simultaneously.

3. The method of claim 1, wherein the mixture comprising the PLA hydrolysis slurry of step (a) and the fermentation broth of step (b) is obtained by gradually adding the PLA hydrolysis slurry to the lactic acid fermenter during fermentation.

4. The method of claim 1, wherein step (a) is performed at a temperature in the range of 50°C to 90°C or wherein step (a) is performed for a period of time in the range of 1 to 12 hours or 12 to 36 hours.

5. The method of claim 1, wherein the metal oxide or hydroxide of step (a) and the alkaline compound of step (b) are the same compound.

6. The method of claim 1, wherein the first and second counterions are different.

7. The method of claim 6, wherein at least one of the PLA hydrolysis slurry of step (a) and the fermentation broth of step (b) are subjected to ion exchange thereby resulting in a first and second counterions which are the same.

8. The method of claim 1, wherein the metal oxide or alkaline compound comprise at least one of MgO, CaO, and a mixture or combination thereof.

9. The method of claim 1, wherein the hydroxide or alkaline compound comprise at least one of NaOH, KOH, NH_4OH, $Ca(OH)_2$, $Mg(OH)_2$, and a mixture or combination thereof.

10. The method of claim 9, wherein the hydroxide is $Mg(OH)_2$.

11. The method of claim 1, wherein the lactate salt is magnesium L-lactate salt.

12. The method of claim 1, further comprising pretreatment of the PLA waste prior to step (a), wherein pretreatment comprises mechanical pretreatment selected from the group consisting of grinding, chipping, shredding, milling, and a combination thereof.

13. The method of claim 1, further comprising subjecting the PLA hydrolysis slurry obtained in step (a) to solid-liquid separation.

14. The method of claim 1, wherein the organic waste comprises endogenous D-lactic acid, L-lactic acid or both.

15. The method of claim 1, wherein the PLA waste comprises poly L-lactic acid (PLLA) and poly D-lactic acid (PDLA).

16. The method of claim 1, wherein step (c) is performed and wherein the D-lactic acid degrading enzyme in step (c) is a D-lactate oxidase.

17. The method of claim 1, wherein the obtained L-lactate salt is purified by at least one of crystallization, recrystallization, distillation, partitioning, silica gel chromatography, preparative HPLC, and combinations thereof.

18. The method of claim 1, wherein the obtained L-lactate salt is acidified to form L-lactic acid for subsequent polylactic acid formation.