CLAIMS

What is claimed is:

1. A method for producing a ~~product~~ solvent, the method comprising:

producing fructose by saccharifying a biomass and contacting the saccharified biomass with an isomerization agent selected to convert glucose to fructose; and

converting the fructose to a ~~product~~ solvent with a microorganism ~~and/or an enzyme~~ while maintaining metabolic conditions that cause the microorganism to produce a protective substrate that protects the microorganism from a toxic effect of the solvent.

2. The method of claim 1, wherein the biomass comprises a cellulosic or lignocellulosic material.

3. The method of any of the above claims ~~claim 1~~, wherein the isomerization agent is an isomerase.

4. The method of claim 3, wherein the isomerase is xylose isomerase.

5. The method of any of the above claims ~~claim 2~~, wherein the ~~cellulosic or lignocellulosic~~ biomass has been ~~is~~ treated to reduce its recalcitrance to saccharification.

6. The method of claim 5, wherein the treatment method is selected from the group consisting of: bombardment with electrons, sonication, oxidation, pyrolysis, steam explosion, chemical treatment, mechanical treatment, freeze grinding and combination thereof.

7. The method of claim 6, wherein the treatment method is bombardment with electrons.

8. The method of any of the above claims ~~claim 2~~, wherein the ~~cellulosic or lignocellulosic~~ biomass is selected from the group consisting of: paper, paper products, paper waste, paper pulp, pigmented papers, loaded papers, coated papers, filled papers, magazines, printed matter, printer paper, polycoated paper, card stock, cardboard, paperboard, cotton, wood, particle board, forestry wastes, sawdust, aspen wood, wood chips, grasses, switchgrass, miscanthus, cord grass, reed canary grass, grain residues, rice hulls, oat hulls, wheat chaff, barley hulls,

agricultural waste, silage, canola straw, wheat straw, barley straw, oat straw, rice straw, jute, hemp, flax, bamboo, sisal, abaca, corn cobs, corn stover, soybean stover, corn fiber, alfalfa, hay, coconut hair, sugar processing residues, bagasse, beet pulp, agave bagasse, algae, seaweed, manure, sewage, arracacha, buckwheat, banana, barley, cassava, kudzu, oca, sago, sorghum, potato, sweet potato, taro, yams, beans, favas, lentils, peas, industrial waste, and mixtures of any of these.

9. The method of any of the above claims wherein the microorganism comprises a strain of *Clostridium spp.*

10. The method of claim 9, wherein the microorganism is *C. saccharoperbutylacetonicum.*

11. The method of claim 10, wherein the microorganism is *C. saccharoperbutylacetonicum* strain ATCC 27021.

12. The method of claim 10 wherein the microorganism is *C. saccharoperbutylacet*onicum strain ATCC 27022.

~~13. The method of claim 1, wherein the product comprises a solvent.~~

13~~14~~. The method of any of the above claims ~~claim 13~~, wherein the solvent comprises an alcohol.

14~~15~~. The method of claim 13 ~~9~~, wherein the alcohol comprises butanol, optionally isobutanol or n-butanol.

15. The method of any one of the above claims, wherein the protective substrate comprises lipids, optionally a triglyceride.

16. The method of claim 15, wherein the lipids are produced through a glycosis pathway.

17. The method of claim 15, wherein the triglyceride is produced by esterification of glycerol 3-phosphate through a D-glyceraldehyde pathway.

18. The method of any of the above claims, further comprising providing a food-based nutrient package for the microorganism.