WHAT IS CLAIMED IS:

1. A method of making a product comprising:

determining the lignin content of a biomass feedstock;

treating the biomass feedstock material with a process selected from the group consisting of mechanical treatment, chemical treatment, radiation, sonication, pyrolysis, oxidation, steam explosion and combinations thereof; and

setting a process parameter of the process based on the lignin content.

2. The method of claim 1, wherein the treating step comprises irradiating with ionizing radiation.

3. The method of claim 2, wherein the setting step comprises setting the dosage of ionizing radiation to be delivered to the feedstock material.

4. The method of claim 3, wherein 0.1 Mrad to 5.0 Mrad is delivered per 1% by weight of lignin in the biomass feedstock.

5. The method of claim 4 wherein 0.25 Mrad to 4.0 Mrad is delivered per 1% by weight of lignin in the biomass feedstock.

6. The method of claim 5 wherein 0.3 Mrad to 3.5 Mrad is delivered per 1% by weight of lignin in the biomass feedstock.

7. The method of claim 2 wherein treating with ionizing radiation comprises treating with an electron beam.

8. The method of any one of the above claims further comprising converting at least a portion of the treated biomass feedstock, utilizing a microorganism, to produce a product.

9. The method of claim 8, wherein the product comprises an alcohol.

10. The method of claim 8, wherein the product comprises a carboxylic acid, ester of carboxylic acid, salt of carboxylic acid, or a mixture thereof.

11. The method of any one of the above claims, further comprising repeating the determining, treating and setting steps with a second feedstock.

12. A method of making a product, the method comprising:

providing a cellulosic or lignocellulosic material having a plurality of pendent carboxylic acid groups;

mixing the material in a fluid that includes water to provide a dispersion that has a first pH; and

adding base to the dispersion to increase its pH to a second pH higher than the first pH.

13. The method of claim 12 wherein the first pH is between 2.5 and 4.5.

14. The method of claim 12 wherein the second pH is between about 5 and 7.

15. The method of any one of claims 12-14 further comprising adding a saccharifying agent to the dispersion to saccharify the cellulosic or lignocellulosic material.

16. The method of claim 15 further comprising contacting the saccharified material with a microorganism.

17. The method of any one of claims 12-16 wherein the product comprises a fuel.

18. The method of any one of claims 12-16 wherein the product comprises an alcohol.

19. The method of claim 15 or 16 wherein the saccharifying agent comprises a cellulase.

We claim:

1. A method of producing a treated biomass comprising:
determining the lignin content of a biomass feedstock,
irradiating the feedstock with a dosage of ionizing radiation, and
mechanically treating the biomass feedstock, wherein
the dosage of ionizing radiation is set based on an empirically determined relationship between lignin content of the feedstock, recalcitrance of the feedstock, and dosage of said the ionizing radiation,
thereby providing a treated biomass having reduced recalcitrance relative to the recalcitrance of the biomass feedstock.

2. The method of claim 1 wherein the mechanical treatment is selected from the group consisting of cutting, milling, pressing, grinding, shearing, chopping and combinations of these.

3. The method of claim 2 wherein milling is selected from the group consisting of ball milling, hammer milling, rotor/stator, dry, wet milling and combinations of these.

4. The method of any one of the above claims wherein the feedstock is contacted with a chemical while mechanically treating the feedstock.

5. The method of any one of the above claims wherein the chemical is steam, an acid or a base.

6. The method of claim 5 wherein the acid is a mineral acid or an organic acid.

7. The method of claim 6 wherein the mineral acid is sulfuric acid or hydrochloric acid.

8. The method of any one of the above claims, wherein said mechanical treatment is performed under a hydrated state or wet state.

9. The method of any one of the above claims wherein the biomass feedstock is irradiated with 0.1 Mrad to 5.0 Mrad per 1% by weight of lignin in the biomass feedstock.

10. The method of any one of the above claims wherein the biomass feedstock is irradiated with 0.25 Mrad to 4.0 Mrad per 1% by weight of lignin in the biomass feedstock.

11. The method of any one of the above claims wherein the biomass feedstock is irradiated with 0.3 Mrad to 3.5 Mrad per 1% weight of lignin in the biomass feedstock.

12. The method of any one of the above claims wherein irradiating with ionizing radiation comprises irradiating with an electron beam.

13. The method of any one of the above claims wherein the biomass feedstock is a lignocellulosic or cellulosic material.

14. The method of any one of the above claims wherein the biomass is selected from the group consisting of paper, paper products, wood, wood-related materials, particle board, grasses, rice hulls, bagasse, cotton, jute, hemp, flax, bamboo, sisal, abaca, straw, corn cobs, coconut hair, algae, seaweed, altered celluloses, (such as cellulose acetate, regenerated cellulose, and the like) and mixtures of any of these.