CLAIMS

What is claimed is:

1. A process for producing a purified biodiesel from a feedstock containing unsaponifiable material, said method comprising:
    a. introducing the feedstock to a pre-treatment process to produce a pretreated feedstock;
    b. introducing the pretreated feedstock to an FFA refining process to produce a refined feedstock;
    c. reacting the refined feedstock in a transesterification reactor with an alcohol to produce a crude biodiesel;
    d. purifying the crude biodiesel to produce a purified biodiesel and a biodiesel residue;
    e. treating the biodiesel residue to recover a biodiesel residue remainder, waxes, terpenes, sterols, and sterol esters by:
        i. treating the biodiesel residue with a first solvent to remove waxes and terpenes by sedimentation and recovering a liquid phase therefrom;
        ii. treating the liquid phase with a second solvent to recover a biodiesel blendstock and a second liquid phase, wherein the first solvent has a lower polarity and a lower molecular weight than the second solvent; and
        iii. evaporating the first solvent and any remaining second solvent from the second liquid phase to recover the biodiesel residue remainder and a sediment solid or gel comprising the sterols and sterol esters;
    f. one of the following steps:
        i. introducing the biodiesel residue remainder to a biodiesel feedstock or a biodiesel blendstock; or

ii. blending the biodiesel residue remainder with the purified biodiesel.

2. The process of claim 1 wherein the purification step includes using at least one of cold filtration, distillation, membrane filtration, and resin filtration.
3. The process of claim 1 wherein the purification is by distillation.
4. The process of claim 3 wherein the biodiesel distillation occurs between 170 - 300°C and 800 – 0 Torr.
5. The process of claim 1 further comprising drying the crude biodiesel using an alcohol stripper to remove water and alcohol before purifying the crude biodiesel in step (d).

6. A process for recovering a valuable chemical while producing purified biodiesel from a feedstock, said process comprising:

a. reacting the feedstock in a transesterification reactor with an alcohol to produce a crude biodiesel stream;

b. purifying the crude biodiesel stream by distillation to produce a purified biodiesel stream and a distillation bottoms; and

c. recovering one or more valuable chemicals from the distillation bottoms by:

i. treating the distillation bottoms with a first solvent to produce a first liquid and a sediment having waxes and terpenes;

ii. treating the sediment having waxes and terpenes with a second solvent to produce a second liquid, wherein the first solvent has a higher polarity than the second solvent;

iii. combining the first liquid and second liquid to produce a solvent stream having biodiesel, glycerides, sterols, and steryl esters;

iv. treating the solvent stream with water to produce a water layer, a sediment having the sterols and steryl esters, and an organic phase having the biodiesel and glycerides;

v. recovering the sterols and steryl esters; and

vi. removing residual solvent from the organic phase then directing the organic phase to a biodiesel feedstock or a biodiesel blendstock;

wherein the one or more valuable chemicals include at least one of the following: the sterols, the steryl esters, the terpenes, and the waxes.

7. The process of claim 6 wherein the biodiesel distillation occurs between 170 - 300°C and 800 – 0 Torr.
8. The process of claim 6 further comprising drying the crude biodiesel using an alcohol stripper to remove water and alcohol before purifying the crude biodiesel in step (b).