CLAIMS

1. An integrated method for mesophase pitch and petrochemicals production, the method comprising the steps of:

supplying crude oil to a reactor vessel;

pressurizing the vessel to an initial pressure with nitrogen in addition to or alternative to one ore more inert gases at about room temperature to between about 145 psig and about 870 psig;

heating the crude oil in the reactor vessel to a predetermined temperature for a predetermined amount of time;

reducing asphaltene content in the crude oil simultaneously with the production of high quality optically anisotropic mesophase pitch by allowing polymerization reactions to occur in the reactor vessel at an elevated pressure in absence of oxygen, between about 1,700 psig and about 2,500 psig;

producing a three-phase upgraded hydrocarbon product comprising gas, liquid, and solid hydrocarbon components, where the liquid hydrocarbon component comprises deasphalted oil and the solid hydrocarbon component comprises the high quality optically anisotropic mesophase pitch;

separating the gas, liquid, and solid hydrocarbon components;

directly utilizing the liquid hydrocarbon component for petrochemicals production; and

directly utilizing the solid hydrocarbon component for carbon artifact production.

2. The method according to claim 1, where the crude oil is crude oil received directly from a wellhead after being separated from natural gas and dewatered, but otherwise not pretreated prior to the step of supplying crude oil to the reactor vessel.

3. The method according to claim 1, where the predetermined temperature is between about 350 °C. and about 575 °C.

4. The method according to either of claim 1 or 2, where the predetermined temperature is between about 400 °C. and about 450 °C.

5. The method according to claim 1, where the step of pressurizing the vessel to an initial pressure includes evacuating oxygen from the reactor vessel using a gas comprising nitrogen.

6. The method according to claim 1, wherein the step of pressurizing the vessel pressurizes the vessel to between about 435 psig and about 725 psig.

7. The method according to claim 1, where the predetermined amount of time is between about 2 hours and about 15 hours.

8. The method according to claim 1, where the predetermined amount of time is between about 4 hours and about 8 hours.

9. The method according to claim 1, where the step of reducing asphaltene content reduces the asphaltene content in the deasphalted oil to less than about 2% by weight.

10. The method according to claim 1, where the elevated pressure is between about 1,800 psig and 1,900 psig.

11. The method according to claim 1, where the step of directly utilizing the liquid hydrocarbon component for petrochemicals production includes the step of supplying the deasphalted oil to a fluidized catalytic cracking process.

12. The method according to claim 1, where the step of directly utilizing the liquid hydrocarbon component for petrochemicals production includes the step of supplying the deasphalted oil to a steam cracking process.

13. The method according to claim 1, where the step of directly utilizing the solid hydrocarbon component for carbon artifact production includes the step of producing carbon fiber from the mesophase pitch.

14. The method according to claim 1, where the crude oil comprises at least one hydrocarbon selected from the group consisting of: heavy crude oil; light crude oil; and crude oil residue with a boiling point greater than about 500 °C.

15. The method according to claim 1, where an asphaltene compound content of the deasphalted oil is reduced by at least about 50% by mass relative to an asphaltene compound content of the crude oil.

16. The method according to claim 1, where an asphaltene compound content of the deasphalted oil is reduced by at least about 90% by mass relative to an asphaltene compound content of the crude oil.

17. The method according to claim 1, where a metal content in the liquid hydrocarbon component is less than a metal content in the crude oil.

18. The method according to claim 1, where the solid hydrocarbon component is at least about 90% pure mesophase pitch.