What is Claimed:

1. A system for conversion of organic polymeric material to hydrocarbonaceous materials, comprising:

   a thermal cracking train,

   the thermal cracking train configured to effect molecular cracking of a polymeric material fed to the thermal cracking train;

   a condensing train,

   the condensing train configured to receive a thermal cracking product from the thermal cracking train and condense at least a portion of the thermal cracking product to give rise to a pyrolysis oil product from the thermal cracking product; and

   a separating train,

   the separating train configured to receive from the condensing train a first liquid comprising a solid material and the pyrolysis oil product,

   the separating train being configured to separate at least some of the pyrolysis oil product from the first liquid.

2. The system of claim 1, wherein the thermal cracking train is configured to expose the polymeric material to a plurality of temperature zones.

~~3. The system of any one of claims 1-2, further comprising a supply of at least one inorganic additive for communication to the thermal cracking train.~~

~~4.~~3. The system of any one of claims 1-2, wherein the thermal cracking train is configured to devolatilize a char derived from cracking of the polymeric material.

~~5. The system of any one of claims 1-2, wherein the thermal cracking train comprises a reactor defining a reaction chamber having a length and being operable to have a plurality of temperature zones along the length of the reaction chamber.~~

~~6. The system of any one of claims 1-2, wherein the condensing train comprises a first condenser in fluid communication with the thermal cracking train,~~

~~the first condenser optionally configured as a direct contact condenser,~~

~~and the first condenser configured to receive the thermal cracking feed from the thermal cracking train.~~

7. The system of claim 6, wherein the first condenser effects contact between (1) first liquid recycled to the first condenser from the separating train and (2) thermal cracking feed received by the first condenser from the thermal cracking train.

8. The system of claim 6, wherein the condensing train comprises a second condenser,

the second condenser configured to receive a first overhead from the first condenser, and

the second condenser being configured to produce, from the first overhead, a condensed pyrolysis oil product and a noncondensed second overhead.

9. The system of claim 8, wherein the condensing train comprises a third condenser configured to receive the noncondensed second overhead from the second condenser, and the third condenser being configured to produce, from the noncondensed second overhead, a noncondensed product and a condensed light product.

10. The system of claim 9, wherein the thermal cracking train is configured to combust the noncondensed product so as to generate heat used in the thermal cracking train.

11. The system of claim 9, further comprising a flare train configured to flare the noncondensed product.

12.4. The system of any one of claims 1-2, wherein the system is configured to communicate at least some of the first liquid that exits the condensing train back to the condensing train.

13. A method, comprising operating a system according to any one of claims 21-22 so as to convert a polymeric material to a char, a gas, and a pyrolysis oil product, the method optionally being performed continuously.

14. The method of claim 13, wherein the pyrolysis oil product has a boiling range of from about 27 deg. C. to about 704 deg. C.

15. The method of claim 13, wherein the pyrolysis oil product comprises from about 10 wt% to about 70 wt% olefin.

16. The method of claim 15, wherein the pyrolysis oil product comprises from about 20 wt% to about 45 wt% olefin.

17. A method, comprising:

effecting thermal cracking of a polymeric material so as to give rise to a thermal cracking product and a char;

optionally devolatilizing and collecting at least some of the char;

condensing at least a portion of the thermal cracking product so as to give rise to (1) a first liquid comprising at least some of the char and a pyrolysis oil product, and (2) a first overhead comprising at least some of the pyrolysis oil product;

separating at least some of the pyrolysis oil product from the first liquid;

condensing a portion of the first overhead so as to give rise to (1) a second liquid comprising the pyrolysis oil product and (2) a second overhead; and

collecting the second liquid.

18. The method of claim 17, further comprising contacting at least some of the first liquid to the thermal cracking product.

19. The method of any one of claims 17-18, wherein separating at least some of the pyrolysis oil product from the first liquid is performed via centrifugal separation.

20. The method of any one of claims 17-18, further comprising condensing at least a portion of the second overhead product so as to give rise to a syngas and a light product output.

21. The method of any one of claims 17-18, wherein the method is performed in a continuous manner.

22.5. A separations train, comprising:

a separation module,

the separation module being configured to receive, optionally from a condenser, a feed material comprising a char and a pyrolysis oil product,

the separation module being operable to separate the char and the pyrolysis oil from one another;

a receiving line configured to receive pyrolysis oil product from the separation module.

23.6. The separations train of claim 225, wherein the separation module is characterized as a decanter centrifuge.

24. The separations train of claim 23, further comprising at least one filter configured to filter the feed material before the feed material enters the decanter centrifuge.

25.7. The separations train of claim 236, wherein the separation module is characterized as a multiphasic decanter centrifuge.

26. The separations train of claim 25, further comprising a source of separation liquid configured for communication to the multiphasic decanter centrifuge.

27. The separations train of claim 26, further comprising an outlet for separation liquid communicated to the multiphasic decanter centrifuge.

28. The separations train of any one of claims 26-27, further comprising at least one filter configured to filter the feed material before the feed material enters the multiphasic decanter centrifuge.

29. The separations train of any one of claims 23-27, further comprising a char receiving line configured to receive char from the decanter centrifuge.

30. The separations train of any one of claims 22-27, wherein the receiving line is configured to place separated pyrolysis oil product into fluid communication with a collection location.

31. The separations train of any one of claims 22-27, wherein the separations train is configured to recycle at least a portion of the feed material to a source of the feed material.

32. A solid-liquid separations method, comprising:

introducing, to a separation module, a feed comprising a pyrolysis oil product and a char,

with the separation module, effecting separation of the pyrolysis oil product and the char fluid from one another;

collecting the char; and

collecting at least some of the pyrolysis oil product.

33. The method of claim 32, wherein the source of the feed is a condenser.

34. The method of claim 33, wherein the condenser is a spray-down condenser.

35. The method of any one of claims 32-34, wherein a portion of the feed from the condenser is recycled back to the condenser.

36. The method of any one of claims 32-34, wherein the separation module is characterized as a decanter centrifuge.

37. The method of claim 36, further comprising filtering the feed material before the feed material enters the decanter centrifuge.

38. The method of claim 36, wherein the separation module is characterized as a multiphasic decanter centrifuge.

~~39. The method of claim 38, further comprising communicating a separation liquid to the multiphasic decanter centrifuge.~~

~~40. The separations train of claim 39, further comprising separating the separation liquid from the pyrolysis oil and char communicated to the multiphasic decanter centrifuge.~~

~~41. The method of any one of claims 32-34, wherein the method is performed in a continuous manner.~~

~~42.~~8. A thermal cracking treatment train, comprising:

a rotatable kiln reactor;

the rotatable kiln reactor being configured to receive a polymeric feed material,

the rotatable kiln reactor defining at least one interior wall that bounds an interior volume of the rotatable kiln reactor,

the interior volume defining an entrance and an exit along a direction of feed material travel,

the rotatable kiln reactor comprising a section that comprises one or more sweeping features configured to sweep, with rotation of the kiln, a portion of the at least one interior wall,

the rotatable kiln comprising a section that comprises one or more lifter features extending from the at least one interior wall and configured to, with rotation of the kiln, encourage material disposed on the one or more features to fall into the interior volume of the interior kiln;

a combustor configured to provide a heated gas to the rotatable kiln reactor,

the combustor optionally configured to receive and combust a non-condensed hydrocarbonaceous vapor; and

a devolatilization train,

the devolatilization train optionally comprising a first valve, a holding chamber, and a second valve,

the first valve configured to interrupt fluid communication between the interior volume of the rotatable kiln reactor and the holding chamber, and,

the second valve being configured to interrupt fluid communication between the holding chamber and an environment exterior to the holding chamber.

43.9. The thermal cracking train of claim 428, further comprising an auger configured to communicate a material into, along, or out of the interior volume of the rotatable kiln.

44. The thermal cracking train of claim 43, wherein the auger is configured to communicate a material out of the exit of the interior volume of the rotatable kiln.

45. The thermal cracking train of any one of claims 42-44, further comprising a gas delivery train configured to communicate a gas to the holding chamber.

46. The thermal cracking train of any one of claims 42-44, further comprising a gas delivery configured to communicate a gas to the interior volume of the rotatable kiln reactor.

47. The thermal cracking train of any one of claims 45-44, wherein the gas is nitrogen.

48.10. The thermal cracking train of any one of claims 42-448-9, wherein the rotatable kiln reactor defines one or more chambers disposed about the interior volume of the rotatable kiln reactor, the one or more chambers being configured to receive the heated fluid from the combustor.

49. The thermal cracking train of claim 48, wherein the rotatable kiln reactor comprises one or more baffles configured to modulate the amount of heated fluid distributed to the one or more chambers.

50. The thermal cracking train of claim 48, wherein the amount of heated fluid received by the one or more chambers effects zones of different temperature along the direction of material travel.

51.11. The thermal cracking train of any one of claims 42-448-10, wherein the rotatable kiln reactor is configured to define a plurality of temperature zones of different temperature along the direction of material travel.

52. The thermal cracking train of claim 51, wherein the rotatable kiln reactor is configured to define at least a first temperature zone and a second temperature zone, the temperature of the first temperature zone differing from the temperature of the second temperature zone.

53. The thermal cracking train of claim 51, wherein the rotatable kiln reactor comprises one or more portions of refractory material defining a plurality of temperature zones of different temperature along the direction of material travel.

54.12. The thermal cracking train of any one of claims 518-11, wherein (1) the one or more sweeping features comprises chains, wherein (2) the one or more lifter features comprise flanges, ridges, or any combination thereof, or both (1) and (2).

55. The thermal cracking train of claim 51, wherein the one or more lifter features comprise flanges, ridges, or any combination thereof.

56. The thermal cracking train of claim 55, wherein the one or more lifter features are generally oriented parallel to the direction of feed material travel.

57. The thermal cracking train of any one of claims 42-44, comprising a supply of at least one inorganic additive for communication to the extruder.

58. A method, comprising: operating a thermal cracking train according to any one of claims 42-44 so as to give rise to a thermal cracking product and a char, optionally devolatilizing and collecting at least some of the char, and optionally communicating the cracking product to one or more condensers.

59. A method, comprising:

effecting communication of a polymeric feed material within a rotatable kiln reactor having at least one interior wall,

the polymeric feed material being exposed to two or more zones of different temperature within the rotatable kiln reactor,

at least one of the two different temperature zones giving effecting thermal cracking of the polymeric feed material to (1) a thermal cracking product that comprises a pyrolysis oil product and (2) a char;

at least partially devolatilizing the char to give rise to a first devolatilized char;

collecting at least some of the first devolatilized char in a holding chamber;

optionally interrupting fluid communication between the holding chamber and the rotatable kiln reactor;

further devolatilizing the at least some of the first devolatilized char in the holding chamber to give rise to a second devolatilized char;

collecting the second devolatilized char.

60. The method of claim 59, further comprising effecting delivering a gas to the holding chamber so as to reduce entry of vapor from the rotatable kiln reactor into the holding chamber.

61. The method of any one of claims 59-60, further comprising delivering a gas so as to remove material accretion on the at least one interior wall.

~~62. The method of any one of claims 59-60, the polymeric feed material being exposed to from two to about six zones of different temperature within the rotatable kiln reactor.~~

~~63. The method of claim 62, the polymeric feed material being exposed to four zones of different temperature within the rotatable kiln reactor.~~

~~64. The method of any one of claims 59-60, wherein the method is performed in a continuous manner.~~

~~65.~~13. A condensation train, comprising:

a first condenser configured to condense, from a feed vapor provided to the first condenser, a first liquid that comprises a pyrolysis oil product,

the first condenser optionally configured as a spray down condenser;

a second condenser in fluid communication with the first condenser,

the second condenser configured to receive a first overhead from the first condenser,

the second condenser being configured to condense, from the first overhead, a second liquid that comprises the pyrolysis oil product; and

optionally a third condenser in fluid communication with the second condenser,

the third condenser configured to receive a second overhead from the second condenser,

the third condenser configured to condense, from the second overhead, a third liquid comprising pyrolysis oil product.

~~66.~~14. The condensation train of claim 13~~65~~, wherein the first condenser is configured as a spray down condenser.

~~67. The condensation train of any one of claims 65-66, further comprising a flare train configured to flare noncondensed product from the third condenser.~~

~~68.~~15. The condensation train of any one of claims ~~65-66~~13-14, further comprising a fluidic loop configured to communicate first liquid to the first condenser, the fluidic loop optionally comprising an adjustable flow diverter configured to divert at least some of the first fluid to the first condenser.

~~69. The condensation train of claim 68, wherein the fluidic loop comprises an adjustable flow diverter configured to divert at least some of the first fluid to the first condenser.~~

~~70.~~16. The condensation train of any one of claims 13-15~~claim 68~~, wherein the first condenser is configured to contact the feed vapor with pyrolysis oil product communicated to the first condenser.

~~71. The condensation train of any one of claims 65-66, further comprising a gas delivery train configured to communicate a gas to the first condenser, the gas delivery train optionally comprising a transfer pipe.~~

~~72. The condensation train of claim 71, wherein the gas is nitrogen.~~

~~73. The condensation train of any one of claims 65-66, wherein the first condenser is configured to operate at from about ambient temperature to about 204 deg. C.~~

~~74. The condensation train of any one of claims 65-66, wherein the second condenser is configured to operate at from about 16 deg. C. to about 54 deg. C.~~

~~75. The condensation train of any one of claims 65-66, wherein the third condenser is configured to operate at from about 2 deg. C. to about 21 deg. C.~~

~~76. The condensation train of any one of claims 65-66, wherein the third condenser operates at below ambient temperature.~~

~~77. The condensation train of any one of claims 65-66, further comprising at least one of a knockout pot, a one seal pot, or a demister .~~

~~78. The condensation train of claim 77, comprising a knockout pot.~~

~~79. A method, comprising~~

~~communicating, to a first condenser, a feed that includes a vapor comprising a pyrolysis oil product,~~

~~the first condenser optionally being a spray down condenser;~~

~~operating the first condenser so as to give rise to a first liquid that comprises the pyrolysis oil product and a first overhead that comprises the pyrolysis oil product;~~

~~recycling to the first condenser at least some of the first liquid;~~

~~communicating the first overhead to a second condenser;~~

~~operating the second condenser so as to give rise to a second liquid that comprises the pyrolysis oil product and a second overhead that comprises the pyrolysis oil product;~~

~~communicating the second overhead to a third condenser; and~~

~~operating the third condenser so as to give rise to a third liquid that comprises the pyrolysis oil product and a third overhead that comprises noncondensed species.~~

~~80. The method of claim 79, further comprising recycling at least some of the first liquid back to the first condenser and, optionally, cooling the first liquid.~~

~~81. The method of claim 79, further comprising contacting the recycled first liquid to the feed vapor.~~

~~82. The method of any one of claims 79-81, further comprising communicating pyrolysis oil product to the first condenser.~~

~~83. The method of any one of claims 79-81, wherein the first condenser is configured to operate at from about ambient temperature to about 204 deg. C.~~

~~84. The method of any one of claims 79-81, wherein the second condenser is configured to operate at from about 16 deg. C. to about 54 deg. C.~~

~~85. The method of any one of claims 79-81, wherein the third condenser is configured to operate at from about 2 deg. C. to about 21 deg. C.~~

~~86. The method of any one of claims 79-81, wherein the third condenser operates at below ambient conditions.~~

~~87. The method of any one of claims 79-81, further comprising (a) flaring the noncondensed species, (b) combusting the condensed species so as to heat a reactor train that generates the first overhead, or both (a) and (b).~~

~~88. The method of any one of claims 79-81, wherein the first liquid comprises a char.~~

~~89. The method of any one of claims 79-81, further comprising communicating any one or more of the first overhead, the second overhead, and the third overhead to a knockout pot, a seal pot, or a demister.~~

~~90. The method of any one of claims 79-81, wherein the method is performed in a continuous manner.~~

~~91.~~17. An operations unit, comprising:

a first chamber;

a second chamber;

a conduit extending through the first chamber and into the second chamber,

the conduit being at least partially enclosed by a conduit jacket,

the conduit jacket defining an outer diameter,

the conduit placing the second chamber into fluid communication with an environment exterior to the chamber,

the second chamber comprising a wall facing the conduit jacket, and

the second chamber being rotatable relative to the first chamber;

a seal defining a boundary between the first chamber and the second chamber,

the seal extending radially from the wall of the second chamber toward the conduit jacket,

the seal comprising a first flange secured to and extending from the wall of the second chamber, the first flange defining an inner diameter,

(a) the seal comprising a layered portion that comprises a plurality of ring-shaped portions,

at least one of the ring-shaped portions having an inner diameter less than the outer diameter of the conduit jacket such that the at least one of the ring-shaped portions rotatably abuts the conduit jacket, the outer diameter of the conduit jacket optionally no more than about 1.25 cm larger than the inner diameter of the at least one of the ring-shaped portions, or

(b) the seal comprising a brush that rotatably abuts the conduit jacket.

~~92.~~18. The operations unit of claim 17~~91~~, wherein the first flange comprises a plurality of portions.

~~93.~~19. The operations unit of ~~any one of claims 91-92~~claim 17, wherein the layered portion is attached to the first flange.

~~94. The operations unit of any one of claims 91-92, further comprising a first washer, the first washer being attached to the first flange.~~

95. The operations unit of claim 94, wherein the layered portion is attached to a first face of the first washer.

96. The operations unit of claim 95, further comprising a second washer, the second washer being attached to second face of the first washer.

97. The operations unit of claim 96, further comprising a fastener extending at least partially through the first washer, the layered portion, and the second washer.

98. The operations unit of any one of claims 91-92, wherein a ring-shaped portion comprises steel, aluminum, brass, bronze, copper, carbon fiber, glass, vermiculite on glass, or any combination thereof.

99. The operations unit of any one of claims 91-92, wherein the layered portion comprises an alternating arrangement of ring-shaped portions.

100. The operations unit of any one of claims 91-92, wherein the layered portion comprises a periodic arrangement of ring-shaped portions.

101. The operations unit of any one of claims 91-82, wherein the layered portion comprises at least two ring-shaped portions having different moduli.

102. The operations unit of any one of claims 91-92, further comprising a source of pressurized fluid, the source in fluid communication with the second chamber.

103. The operations unit of claim 102, wherein the fluid comprises a non-reactive fluid.

104. The operations unit of claim 102, wherein the fluid comprises nitrogen gas.

105. The operations unit of any one of claims 91-92, further comprising a pressure transducer configured to detect a pressure within the first chamber.

106. The operations unit of any one of claims 91-92, further comprising a pressure transducer configured to detect a pressure within the second chamber.

107. The operations unit of any one of claims 91-92, further comprising a pump configured to reduce a pressure within the second chamber.

~~108. The operations unit of any one of claims 91-92, further comprising a motor configured to rotate the second chamber.~~

~~109.~~20. The operations unit of any one of claims 17-19~~91-92~~, further comprising a circumferentially rotatable joint configured to support rotation of the second chamber.

~~110. The operations unit of claim 109, further comprising a source of a source of pressurized fluid in fluid communication with the circumferentially rotatable joint.~~

~~111. The operations unit of claim 110, wherein the fluid comprises a noble gas.~~

~~112. The operations unit of claim 110, wherein the fluid comprises nitrogen gas.~~

~~113. The operations unit of any one of claims 91-92, wherein the second chamber is configured as a rotatable kiln reactor.~~

~~114. The operations unit of claim 113, wherein the second chamber comprises one or more chains, lifters, or screw flights.~~

~~115. The operations unit of any one of claims 91-92, wherein the seal comprises a layered portion that comprises a plurality of ring-shaped portions, at least one of the ring-shaped portions having an inner diameter less than the outer diameter of the conduit jacket such that the at least one of the ring-shaped portions rotatably abuts the conduit jacket.~~

~~116. The operations unit of any one of claims 91-92, wherein the first chamber is defined by an interference-fit joint that is expandable in response to temperature within the first chamber, within the second chamber, or both.~~

~~117. The operations unit of any one of claims 91-92, further comprising a portion of fabric that at least partially encloses the first chamber.~~

~~118. A method, comprising operating an operations unit according to any one of claims 91-92.~~

~~119. The method of claim 118, wherein the operating is performed so as to pyrolyze a hydrocarbonaceous material.~~