

Claims:

1. A system for producing catalytically treated pyrolytic vapor, the system comprising
- a pyrolysis reactor (100) configured to produce pyrolytic vapor,
 - a catalytic reactor (200) limiting a bed area (B) into which a fluidized catalyst bed is configured to form in use, the catalytic reactor (200) comprising
 - a first inlet (212) for letting in at least a clean part of the pyrolytic vapor,
 - a second inlet (214) for letting in particulate catalyst,
 - a first outlet (222) for letting out catalytically treated pyrolytic vapor,
 - a second outlet (224) for letting out particulate catalyst, and
 - a static mixer (300) configured to spread the particulate catalyst within the bed area (B), wherein
 - the catalytic reactor (200) is configured to produce a mixture of the particulate catalyst and the catalytically treated pyrolytic vapor from the pyrolytic vapor.
2. The system claim 1, wherein
- the static mixer (300) is made of a metal capable of withstanding a temperature of at least 400 °C.
3. The system of claim 1 or 2, wherein in the bed area (B), the pyrolytic vapor is configured to flow, on average, in an axial direction (AX) of the catalytic reactor (200), and the static mixer (300) comprises
- a primary first baffle plate (312, 392), arranged such that
 - a primary first angle (α_{11} , α_{91}) between a normal (N11, N91) of the primary first baffle plate (312, 392) and the axial direction AX is at most 85 degrees, and
 - the primary first baffle plate (312, 392) extends from a wall of the bed area (B) of the catalytic reactor (200) to an interior of the bed area (B); preferably,
 - a full cross section of the bed area (B) of the catalytic reactor (200) is covered by a set of baffle plates, wherein the set of baffle plates comprises the primary first baffle plate (312, 392).

4. The system of any of the claims 1 to 3, comprising
- a third inlet (104) for letting in fluidizing gas to increase flow of gas or gases in the bed area (B) of the catalytic reactor (200); preferably,
- 5 - the third inlet (104) is configured to let the fluidizing gas in to the pyrolysis reactor (100).
5. The system of any of the claims 1 to 4, comprising
- a conveyor (216), such as a screw conveyor, configured to convey the particulate catalyst into the catalytic reactor (200) through the second inlet (214), preferably,
 - the conveyor (216) is configured to convey such particulate catalyst into the catalytic reactor (200), of which average particle size by volume is from 1 μm to 1000 μm .
6. The system of any of the claims 1 to 5, wherein
- the catalytic reactor (200) comprises a particle separator configured to separate the particulate catalyst from the mixture of the particulate catalyst and catalytically treated pyrolytic vapor; preferably
 - the particle separator comprises a cyclone (220) configured to separate the particulate catalyst from the mixture of the particulate catalyst and catalytically treated pyrolytic vapor and
- 25 - the cyclone (220) comprises the first and second outlets (222, 224).
7. The system of any of the claims 3 to 6, wherein the static mixer (300) comprises
- a primary second baffle plate (314), disposed at an angle relative to the primary first baffle plate (312), wherein
 - the primary first angle (α_{11}) is from 30 to 85 degrees, and
 - a primary second angle (α_{12}) of from 30 to 85 degrees is arranged between a normal (N12) of the primary second baffle plate (314) and the axial direction (AX);
- 35 preferably,

- a cross section of the bed area (B) is circular and the primary first and primary second baffle plates (312, 314) are semielliptical.

8. The system of the claim 7, wherein

- 5 - a primary distance (d1) is arranged between the first inlet (212) and at least a part of the primary first baffle plate (312) and
 - the primary distance (d1) is arranged between the first inlet (212) and at least a part of the primary second baffle plate (314); and the static mixer (300) comprises
- 10 - a secondary first baffle plate (322) and a secondary second baffle plate (324), disposed at an angle relative to each other and at an angle from the axial direction (AX) of the catalytic reactor (200), wherein
 - a secondary distance (d2) is arranged between the first inlet (212) and at least a part of the secondary first baffle plate (322),
- 15 - the secondary distance (d2) is arranged between the first inlet (212) and at least a part of the secondary second baffle plate (324), and
 - the secondary distance (d2) is greater than the first distance (d1).

9. The system of any of the claims 3 to 8, wherein

- 20 - the primary first baffle plate (392) limits perforations (380) configured to pass both the pyrolytic vapor and the particulate catalyst; preferably,
 - a normal (N91) of the perforated plate forms an angle of at most 10 degrees with the axis (AX) of the catalytic reactor (200);
- 25 more preferably,
 - the static mixer (300) comprises a primary second baffle plate (394) that limits perforations (380) and is configured to pass both the pyrolytic vapor and the particulate catalyst, wherein
 - a primary distance (d1) is arranged between the first inlet (212) and at least
- 30 a part of the primary first baffle plate (392),
 - a secondary distance (d2) is arranged between the first inlet (212) and at least a part of the primary second baffle plate (394), and
 - the secondary distance (d2) is greater than the primary distance (d1).

10. The system of claim 9, wherein
- a total cross sectional area of the perforations (380) of the primary first baffle plate (392) is from 30 % to 60 % of a cross sectional area of the bed area (B) of the catalytic reactor (200).
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11. The system of any of the claims 1 to 10, comprising
- a regenerator (130) configured to regenerate particulate catalyst receivable from the second outlet (224);
 - preferably, the system comprises
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- means, such as a channel (122), for transferring at least some of the particulate catalyst from the second outlet (224) to the regenerator (130) and from the regenerator (130) to the second inlet (214).
12. The system of any of the claims 1 to 11, comprising
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- a condenser (510) configured to cool at least a part of the catalytically treated pyrolytic vapor and condense at least part of the catalytically treated pyrolytic vapor;
 - preferably,
 - the system comprises means for conveying non-condensable gas from the
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- condenser (510) into at least one of the pyrolysis reactor (100) and the catalytic reactor (200).
13. A method for producing catalytically treated pyrolytic vapor, the method comprising
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- producing pyrolytic vapor,
 - feeding at least a clean part of the pyrolytic vapor and particulate catalyst into a catalytic reactor,
 - fluidizing the pyrolytic vapor and the particulate catalyst in a bed area of the catalytic reactor,
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- allowing the pyrolytic vapor to chemically react in the presence of the particulate catalyst to produce a mixture of the particulate catalyst and catalytically treated pyrolytic vapor, and
 - in the bed area, mixing the pyrolytic vapor and the particulate catalyst with a static mixer.
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14. The method of claim 13, wherein the clean part of the pyrolytic vapor is produced by
- feeding pyrolyzable material into a pyrolysis reactor,
 - fluidizing the pyrolyzable material in the pyrolysis reactor,
 - 5 - pyrolyzing the pyrolyzable material in the pyrolysis reactor to produce raw pyrolytic vapor, and
 - cleaning the raw pyrolytic vapor to produce the clean part of the pyrolytic vapor.
- 10 15. The method of claim 13 or 14, wherein
- the particulate catalyst comprises zeolite; preferably,
 - an average particle size of the particulate catalyst by volume is from 1 μm to 1000 μm .