CLAIMS

What is claimed is:

1. A system for reacting a first fluid with a body, the system comprising:
   a container having an inlet and an outlet; and
   a body disposed between the inlet and outlet, the body comprised of ash particles, and having sufficient porosity that the first fluid reacts with the body during passage from the inlet to the outlet.

2. The system of claim 1, wherein at least a portion of the body includes a pore size distribution, pore connectivity, and a length configured to allow passage of the first fluid through the portion, and the body is disposed in the container such that the first fluid must pass through the portion during passage from the inlet to the outlet.

3. The system of claim 1, wherein the porosity at least partially results from a removal of a fugitive phase during fabrication of the body.

4. The system of claim 3, wherein the fugitive phase includes a carbonaceous phase.

5. The system of claim 3, wherein the fugitive phase includes a residue associated with the ash particles via a process that produced the ash particles.

6. The system of claim 2, wherein the pore size distribution is configured to filter a substance from the first fluid during passage through the portion.

7. The system of claim 1, further comprising a catalyst to catalyze a reaction involving the first fluid.

8. The system of claim 1, wherein the body has a tensile strength of at least 1 MPa.

9. The system of claim 1, wherein the porosity is between 4% and 97%.

10. The system of claim 9, wherein the porosity is between 10% and 85%.

11. The system of claim 1, wherein the body includes one or more channels substantially open to a flow of the first fluid.

12. The system of claim 2, wherein the body includes a channel substantially open to a flow of the first fluid, and the portion of the body through which the first fluid passes is associated with the channel.

13. The system of claim 1, wherein at least a portion of the ash particles are bonded to each other with bonds associated with a cementitious reaction.

14. The system of claim 1, wherein at least a portion of the ash particles are bonded to each other with bonds at least partially resulting from a firing operation.

15. The system of claim 14, wherein the firing operation includes temperatures above 900 degrees Celsius.

16. A method of reacting a first fluid comprising:
selecting a system according to claim 1; and
causing the first fluid to pass from the inlet to the outlet via the body.

17. The method of claim 16, wherein the first fluid includes an exhaust gas from a combustion process.

18. A method of filtering a substance from a first fluid comprising:
selecting a system according to claim 2; and
causing the first fluid to pass from the inlet to the outlet via the portion.

19. The method of claim 18, wherein the first fluid includes an exhaust gas from a combustion process.

20. The method of claim 18, wherein the first fluid includes a liquid metal.

21. A method of manufacturing a body for treating a first fluid, the method comprising:
selecting the first fluid to be treated with the body;
selecting an ash source having one or more properties associated with the treatment; and
forming the ash source into a body configured for treating the first fluid.

22. The method of claim 21, wherein treating includes filtering, and the body includes a permeability appropriate for filtering the fluid.

23. The method of claim 21, wherein forming includes fabricating one or more channels in the body, each channel configured to allow flow of the first fluid through the channel at a substantially lower impedance than flow through a wall associated with the channel.

24. The method of claim 21, wherein the ash source includes a fugitive phase that will be removed in a subsequent step, and forming comprises a step to remove the fugitive phase.

25. The method of claim 21, wherein forming includes mixing the ash source with a fugitive phase that will be removed in a subsequent step, and the method further comprises a step to remove the fugitive phase.

26. The method of claim 21, wherein forming includes disposing the ash source in a container through which the first fluid passes during treatment.

27. The method of claim 21, wherein forming includes firing the body.

28. The method of claim 27, wherein, prior to firing, the body includes a fugitive phase, and the fugitive phase is removed during firing.

29. The method of claim 21, wherein forming includes the use of cementitious bonding.

30. A fluidized bed system comprising:
a container configured to contain a plurality of particles, the container having an inlet and an outlet, the inlet configured to provide a fluid to the plurality of particles in a manner that causes the plurality of particles to behave as a fluidized bed; and
a plurality of ash particles disposed between the inlet and outlet within the container.

31. A filter bed comprising:
a container having an inlet and an outlet and configured to contain a plurality of particles; and
a plurality of ash particles disposed between the inlet and outlet within the container.

32. A body for treating an exhaust gas, the body comprising a plurality of bonded ash particles and including a plurality of channels.

33. An exhaust gas treatment system comprising:
a container having an inlet and an outlet; and
a body according to claim 32 disposed between the inlet and outlet such that the exhaust gas passes through the channels in passing from the inlet to the outlet.

34. The exhaust gas treatment system of claim 33, wherein a first set of channels is in fluid communication with the inlet, a second set of channels is in fluid communication with the outlet, and in passing from the inlet to the outlet, the exhaust gas must pass from the first set to the second set via a porosity in the body.

35. A computer readable storage medium having embodied thereon a program executable by a processor to perform a method comprising:
determining an application vector;
selecting a source material;
calculating a body vector according to one or more properties of the source material;
comparing the body vector to the application vector; and
determining a quality of match between the body and application vectors.

36. The computer readable storage medium of claim 35, wherein the method further comprises selecting a forming process, and the body vector calculation includes one or more properties of the forming process.

37. The computer readable storage medium of claim 35, wherein the source material includes an ash source.

CLAIMS

1. A method comprising:

providing a body having:

an upstream side;

a downstream side;

an upstream channel open to the upstream side, the upstream channel in fluid communication with the downstream side via a porous wall comprising a first region between the upstream and downstream sides, the first region having a first pore size distribution;

depositing particles on the upstream side of the first region; and

processing the deposited particles to yield a layer having a second pore size distribution, the second pore size distribution having a smaller median pore size than that of the first pore size distribution.

2. The method of claim 1, wherein at least some of the particles are deposited within the first region.

3. The method of claim 1, wherein depositing the particles comprises filtering the particles during passage of a fluid comprising the particles from the upstream side to the downstream side.

4. The method of claim 1, wherein the deposited particles have a D50 that does not exceed 2.8 microns.

5. The method of claim 1, wherein processing includes sintering the deposited particles.

6. The method of claim 1, wherein:

the first region has a mean pore diameter between 5 and 60 microns;

the particles have a D50 that does not exceed 2.8 microns;

at least some of the particles are deposited within the first region; and

processing includes sintering the deposited particles.

7. A body comprising:

an upstream side;

a downstream side;

an upstream channel open to the upstream side, the upstream channel in fluid communication with the downstream side via a porous wall comprising:

a first region between the upstream and downstream sides, the first region having a first pore size distribution; and

a layer deposited on the upstream side of the first region, the layer having a second pore size distribution, the second pore size distribution having a smaller median pore size than that of the first pore size distribution.

8. The body of claim 7, wherein the layer comprises at least one of, cordierite and aluminum titanate.

9. The body of claim 7, wherein the layer comprises sintered particles supported by the first region.

10. The body of claim 9, wherein the layer has a grain size distribution that is at least bimodal.

11. The body of claim 7, wherein the first region has a mean pore diameter between 5 and 60 microns.

12. The body of claim 7, wherein the layer has a median pore diameter between 1.8 and 12.2 microns.

13. The body of claim 7, wherein the layer has a porosity between 30% and 70%.

14. The body of claim 7, wherein the layer comprises silicon carbide.

15. The body of claim 7, further comprising a downstream channel open to the downstream side and separated from the upstream channel by the porous wall.

16. The body of claim 15, wherein the upstream channel has a cross sectional area larger than that of the downstream channel.

17. The body of claim 15, further comprising a plurality of upstream channels, a plurality of downstream channels, and the upstream channels are separated from the adjacent downstream channels by porous walls.

18. The body of claim 7, wherein the layer has a median pore size between 4 and 22 microns.

19. The body of claim 7, wherein the layer has a melting point above 1250 degrees Celsius.

20. The body of claim 7, wherein the wall has a thickness between 50 microns and 2mm.

21. The body of claim 7, wherein the body has a coefficient of thermal expansion below 1E-5/degree Celsius.

22. The body of claim 7, further comprising one or more supports that reinforce the upstream channel against pressure exerted by a fluid in the upstream channel.

23. The body of claim 7, wherein
the first region has a mean pore diameter between 5 and 60 microns;
the layer comprises sintered particles supported by the first region; and
the layer has a median pore diameter between 1.8 and 12.2 microns.