CLAIMS

1. A method for infiltrating a porous ceramic matrix composite (CMC) preform (102), the method comprising:

positioning the porous CMC preform (102) in an opening (110) of a die set (104) for an infiltration system (100), the CMC preform (102) including:

a plurality of ply stacks (134, 136), each of the plurality of ply stacks (134, 136) including a predetermined, unidirectional material orientation, and

a plurality of voids (138, 170) formed between each of the plurality of ply stacks (134, 136);

flowing a molten densifier (118) over the porous CMC preform (102) in a first flow direction to infiltrate the plurality of voids (138, 170) formed between each of the plurality of ply stacks (134, 136) of the CMC preform (102); and

flowing the molten densifier (118) over the porous CMC preform (102) in a second flow direction, distinct from the first flow direction, to infiltrate the plurality of voids (138, 170) formed between each of the plurality of ply stacks (134, 136) of the CMC preform (102),

wherein the second flow direction is substantially parallel to the predetermined, unidirectional material orientation of at least one ply stack (134) of the plurality of ply stacks (134, 136) of the CMC preform (102);~~.~~

wherein positioning the porous CMC preform (102) in the opening (110) of the die set (104) includes: aligning the predetermined, unidirectional material orientation of the at least one ply stack (134) of the plurality of ply stacks (134, 136) of the CMC preform (102) with the second flow direction of the flowing molten densifier (118);

the method further comprising:

flowing the molten densifier (118) over the porous CMC preform (102) in a third flow direction, distinct from the first flow direction, to infiltrate the plurality of voids (138, 170) formed between each of the plurality of ply stacks (134, 136) of the CMC preform (102),

wherein the third flow direction is substantially parallel to the predetermined, unidirectional material orientation of at least one distinct ply stack (134) of the plurality of ply stacks (134, 136) of the CMC preform (102).

2. The method of claim 1, wherein the first flow direction is substantially perpendicular to the predetermined, unidirectional material orientation of the at least one ply stack (134) of the plurality of ply stacks (134, 136) of the CMC preform (102).

~~3. The method of claim 1, wherein positioning the porous CMC preform (102) in the opening (110) of the die set (104) includes:~~

~~aligning the predetermined, unidirectional material orientation of the at least one ply stack (134) of the plurality of ply stacks (134, 136) of the CMC preform (102) with the second flow direction of the flowing molten densifier (118).~~

~~4~~3. The method of claim 1, wherein flowing the molten densifier (118) over the porous CMC preform (102) in the first flow direction further includes:

supplying the molten densifier (118) over the porous CMC preform (102) in the first flow direction at a pressure equal to or above atmospheric pressure.

~~5~~4. The method of claim 1, wherein flowing the molten densifier (118) over the porous CMC preform (102) in the second flow direction further includes:

supplying the molten densifier (118) over the porous CMC preform (102) in the second flow direction at a pressure above atmospheric pressure.

~~6. The method of claim 1, further comprising:~~

~~flowing the molten densifier (118) over the porous CMC preform (102) in a third flow direction, distinct from the first flow direction, to infiltrate the plurality of voids (138, 170) formed between each of the plurality of ply stacks (134, 136) of the CMC preform (102),~~

~~wherein the third flow direction is substantially parallel to the predetermined, unidirectional material orientation of at least one distinct ply stack (134) of the plurality of ply stacks (134, 136) of the CMC preform (102).~~

~~7. The method of claim 6, wherein the first flow direction is substantially perpendicular to the predetermined, unidirectional material orientation of the at least one distinct ply stack (134) of the plurality of ply stacks (134, 136) of the CMC preform (102).~~

~~8~~5. The method of claim ~~6~~1, wherein third flow direction is distinct from the second flow direction.

~~9~~6. The method of claim ~~6~~1, wherein flowing the molten densifier (118) over the porous CMC preform (102) in the third flow direction further includes:

supplying the molten densifier (118) over the porous CMC preform (102) in the third flow direction at a pressure above atmospheric pressure.

~~10~~7. The method of claim 1, further comprising at least one of:

controlling a velocity of the molten densifier (118) flowing over the porous CMC preform (102) in the first flow direction, or

controlling a velocity of the molten densifier (118) flowing over the porous CMC preform (102) in the second flow direction.