

and performing a gravel packing operation. However, expandable screens can be expensive, require complex installation procedures, and take a significant amount of time to reach an expanded state.

SUMMARY

[0005] ~~In an embodiment, a well screen assembly for use in a wellbore comprises a base pipe comprising one or more fluid passageways, and a shape-memory alloy disposed about the base pipe. The one or more fluid passageways are configured to provide fluid communication between an exterior of the base pipe and a central flowbore, and the shape-memory alloy is configured to transition between an expanded state and a compressed state in response to a trigger. According to a first aspect of the present invention there is provided a well screen assembly for use in a wellbore comprising: a base pipe comprising one or more fluid passageways, wherein the one or more fluid passageways are configured to provide fluid communication between an exterior of the base pipe and a central flowbore; and a shape-memory alloy disposed about the base pipe, wherein the shape-memory alloy is configured to transition between an expanded state and a compressed state in response to a trigger.~~

[0006] ~~In an embodiment,~~ There is also disclosed a well screen assembly for use in a wellbore comprises a wellbore tubular string comprising a first screen assembly coupled to a second screen assembly, and a shape-memory alloy disposed about the wellbore tubular string. The shape-memory alloy is configured to provide a selectable resistance to axial flow along an exterior of the wellbore tubular string between the first screen assembly and the second screen assembly.

[0007] ~~In an embodiment,~~ There is also disclosed a well screen assembly for use in a wellbore comprises a base pipe comprising one or more fluid passageways, and a shape-memory alloy disposed in a flow path between the exterior of the base pipe and the central flowbore. The one or more fluid passageways are configured to provide fluid communication between an exterior of the base pipe and a central flowbore, and the shape-memory alloy is configured to provide a first resistance to flow in a compressed state and a second resistance to flow in an expanded state.

[0008] ~~In an embodiment, a method comprises providing a trigger to a shape-memory alloy disposed about a base pipe in a wellbore, transitioning the shape-memory alloy from a compressed state to an expanded state in response to the trigger, and establishing fluid communication between an exterior of the base pipe and a central flowbore when the shape-memory alloy is in the expanded state. The base pipe comprises one or more fluid passageways configured to provide fluid communication between the exterior of the base pipe and the central flowbore. According to a second aspect of the present invention, there is provided a method comprising: providing a trigger to a shape-memory alloy disposed about a base pipe in a wellbore, wherein the base pipe comprises~~

one of more fluid passageways configured to provide fluid communication between an exterior of the base pipe and a central flowbore; transitioning the shape-memory alloy from a compressed state to an expanded state in response to the trigger; and establishing fluid communication between the exterior of the base pipe and the central flowbore when the shape-memory alloy is in the expanded state.

[0009] ~~In an embodiment, a method comprises providing a trigger to a shape-memory alloy disposed in a fluid pathway between an exterior of a base pipe and a central flowbore, transitioning the shape-memory alloy from a compressed state to an expanded state in response to the trigger, and changing a fluid resistance through the fluid pathway in response to the transitioning.~~ According to a third aspect of the present invention, there is provided a method comprising: providing a trigger to a shape-memory alloy disposed in a fluid pathway between an exterior of the base pipe and a central flowbore; transitioning the shape-memory alloy from a compressed state to an expanded state in response to the trigger; and changing a fluid resistance through the fluid pathway in response to the transitioning.

10. The well screen of assembly claim 1, wherein the trigger comprises a change in temperature of the shape-memory alloy.
11. The well screen assembly of claim 1, wherein the shape-memory alloy comprises a magnetic shape-memory alloy, and wherein the trigger comprises at least one magnetic field.
12. The well screen assembly of claim 11, wherein the at least one magnetic field is generated by a permanent magnet, an electromagnet, or any combination thereof.
13. A method comprising:
 - providing a trigger to a shape-memory alloy disposed about a base pipe in a wellbore, wherein the base pipe comprises one or more fluid passageways configured to provide fluid communication between an exterior of the base pipe and a central flowbore;
 - transitioning the shape-memory alloy from a compressed state to an expanded state in response to the trigger; and
 - establishing fluid communication between the exterior of the base pipe and the central flowbore when the shape-memory alloy is in the expanded state.
14. The method of claim 13, further comprising expanding a filter element disposed about the base pipe in response to the transitioning.
15. The method of claim 13, further comprising engaging a wellbore wall with the shape-memory alloy in the expanded state.
16. The method of claim 13, further comprising filtering a fluid flowing between the exterior of the base pipe and the central flowbore using the shape-memory alloy.
17. The method of claim 13, further comprising training the shape-memory alloy by exposure to a plurality of temperatures, application of a mechanical stress, application of a magnetic field, or any combination thereof.
18. The method of claim 13, further comprising releasing one or more chemical components in response to transitioning the shape-memory alloy from the compressed state to the expanded state.
19. A method comprising:
 - providing a trigger to a shape-memory alloy disposed in a fluid pathway between an exterior of a base pipe and a central flowbore;