

What is claimed is:

1. A method to monitor expansion of a downhole metallic sealant, the method comprising:
deploying a metallic sealant along a section of a wellbore;
5 exposing the metallic sealant to a reacting fluid to initiate a galvanic reaction;
measuring a change in temperature caused by the galvanic reaction; and
determining an amount of expansion of the metallic sealant based on the change in
the temperature.
- 10 2. The method of claim 1, further comprising:
applying pressure to the metallic sealant to expose a previously unexposed section of
the metallic sealant;
exposing the previously unexposed section of the metallic sealant to the reacting fluid
to initiate a second galvanic reaction;
15 measuring a change in temperature caused by the second galvanic reaction; and
determining an amount of a second expansion of the metallic sealant based on the
change in the temperature caused by the second galvanic reaction.
- 20 3. The method of claim 1, further comprising monitoring an integrity of the metallic sealant
based on the change in the temperature.
4. The method of claim 3, further comprising:
detecting a differential pressure across two points of the metallic sealant;

determining a partial loss of integrity of the metallic sealant in response to detecting the differential pressure;

after detecting the differential pressure, detecting an increase in temperature proximate to the two points of the metallic sealant; and

5 in response to detecting the increase in temperature proximate to the two points, determining whether the integrity of the metallic sealant has been restored.

5. The method of claim 1, further comprising performing a pressure test to determine the amount of expansion of the metallic sealant.

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6. The method of claim 1, further comprising determining a rate of the galvanic reaction, wherein the rate of the galvanic reaction is based on an amount of dopant added to the metallic sealant.

15 7. The method of claim 1, further comprising:

measuring displacement of a non-reacting fluid deposited in the wellbore, wherein the non-reacting fluid is displaced by the expansion of the metallic sealant; and determining the amount of expansion of the metallic sealant based on the displacement of the non-reacting fluid.

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8. The method of claim 1, wherein a fiber optic cable is deployed proximate to the metallic sealant, and wherein measuring the change in temperature comprises utilizing the fiber optic cable to measure the change in temperature.
- 5 9. The method of claim 1, wherein a thermometer is deployed proximate to the metallic sealant, and wherein measuring the change in temperature comprises utilizing the thermometer to measure the change in temperature.
- 10 10. The method of claim 1, further comprising determining a sealant capacity of the metallic sealant based on the amount of expansion of the metallic sealant.
11. The method of claim 1, further comprising flowing the reacting fluid into the wellbore.
- 15 12. The method of claim 1, wherein metallic sealant is deployed at a section of the wellbore that contains the reacting fluid.
13. A method to monitor downhole fluid displacement, the method comprising:
flowing a non-reacting fluid into a wellbore having a metallic sealant deployed along
20 a section of the wellbore;
exposing the metallic sealant to a reacting fluid to initiate a galvanic reaction;
measuring a change in temperature caused by the galvanic reaction;
determining an amount of expansion of the metallic sealant based on the change in
the temperature; and

determining a displacement of the non-reacting fluid based on the amount of expansion of the metallic sealant.

14. The method of claim 13, further comprising:

5 applying pressure to the metallic sealant to expose a previously unexposed section of the metallic sealant;
 exposing the previously unexposed section of the metallic sealant to the reacting fluid to initiate a second galvanic reaction;
 measuring a change in temperature caused by the second galvanic reaction; and
10 determining an amount of a second expansion of the metallic sealant based on the change in the temperature caused by the second galvanic reaction; and
 determining a displacement of the non-reacting fluid based on the amount of the second expansion of the metallic sealant.

15 15. The method of claim 13, further comprising monitoring an integrity of the metallic sealant based on the change in the temperature.

16. The method of claim 13, further comprising:

 detecting a differential pressure across two points of the metallic sealant;
20 determining a partial loss of integrity of the metallic sealant in response to detecting the differential pressure;
 after detecting the differential pressure, detecting an increase in temperature proximate to the two points of the metallic sealant; and

in response to detecting the increase in temperature proximate to the two points,
determining whether the integrity of the metallic sealant has been restored.

17. A downhole metallic sealant measurement system, comprising:

- 5 a galvanically corrodible metallic sealant deployed along a section of a wellbore,
 wherein a galvanic reaction is initiated when the galvanically corrodible metallic
 sealant is exposed to a reacting fluid, and wherein the galvanic reaction causes an
 expansion of the galvanically corrodible metallic sealant to isolate a section of the
 wellbore; and
- 10 a temperature sensor positioned proximate to the galvanically corrodible metallic
 sealant and operable to determine a temperature change caused by the galvanic
 reaction, wherein an amount of expansion of the metallic sealant is determined
 based on the temperature change caused by the galvanic reaction.

15 18. The downhole metallic sealant measurement system of claim 17, wherein the temperature
 sensor is at least one of a fiber optic cable, a thermometer, and a component of a logging
 tool.

 19. The downhole metallic sealant measurement system of claim 17, wherein the temperature
20 sensor is operable to measure a difference in temperature at two different points
 proximate to the metallic sealant to determine the temperature change.

20. The downhole metallic sealant measurement system of claim 17, further comprising a pressure sensor operable to detect a differential pressure at two different points of the galvanically corrodible metallic sealant.