What is claimed is:

1. A metal patch for patching a downhole well casing, the metal patch comprising:

a base; and

a metal sealant having a shape congruent with a section of the downhole well casing and transition-able from a first state to a second state in response to a chemical reaction with water;

wherein the metal sealant forms a casing patch after the metal sealant transitions to the second state;

wherein the metal sealant in response to the chemical reaction with water expands.

2. The metal patch of claim 1 wherein the metal sealant is one of an alkaline earth metal and a transition metal.

3. The metal patch of claim 2 wherein the metal sealant is a compound of magnesium or aluminum and at least one alloying element, wherein the at least one alloying element is selected from a group consisting of Al, Zn, Mn, Zr, Y, Nd, Gd, Ag, Ca, Sn, and RE.

4. The metal patch of claim 2 wherein the metal sealant is alloyed with a dopant that promotes corrosion.

5. The metal patch of claim 3 wherein the at least one alloying element is an element that inhibits passivation.

6. The metal patch of claim 1 wherein the first state is one of: $Mg + 2H_2O$; $Al + 3H_2O$; and $Ca + H_2O$.

7. The metal patch of claim 1 wherein the second state contains a solid that consists of one of: $Mg(OH)_2$; $Al(OH)_3$; and $Ca(OH)_2$.

8. The metal patch of claim 1 further comprising a base having a shape congruent with a section of the well casing.

9. The metal patch of claim 1 wherein the second state is one of: $Mg(OH)_2 + H_2$; $Al(OH)_3 + 3/2\ H_2$; and $Ca(OH)_2$.

10. A method of using a metal patch for patching a well casing downhole in a wellbore environment, the method comprising:

assembling a metal sealant with a base, wherein the metal sealant and the base have a diameter smaller than the diameter of a section of the well casing;

coupling the assembled metal sealant and base to the well casing using a downhole running tool and expandable device; and

wherein the metal sealant is transition-able from a first state to a second state in response to chemical reaction with a water-based fluid;

wherein the metal sealant in response to chemical reaction with water expands and hardens.

11. The method of claim 10 wherein the metal sealant is one of an alkaline earth metal, a transition metal, and a metal oxide.

12. The method of claim 10 wherein the metal sealant is a compound of magnesium and at least one alloy, wherein the at least one alloy is selected from a group consisting of Al, Zn, Mn, Zr, Y, Nd, Gd, Ag, Ca, Sn, and RE.

13. The method of claim 12 wherein the at least one alloy is alloyed with a dopant that promotes corrosion.

14. The method of claim 14 wherein the at least one alloy is alloyed with a dopant that inhibits passivation.

15. The method of claim 11 wherein the first state is one of: $Mg + 2H_2O$; $Al + 3H_2O$; and $Ca + H_2O$ and wherein the second state is one of: $Mg(OH)_2 + H_2$; $Al(OH)_3 + 3/2\ H_2$; and $Ca(OH)_2$.