CLAIMS

1. An apparatus for simultaneously electroplating a first metal and a second, more noble metal onto a substrate, comprising:

(a) an anode chamber for containing anolyte and an active anode, said active anode comprising the first metal;

(b) a cathode chamber for containing catholyte and the substrate;

(c) a separation structure positioned between the anode chamber and the cathode chamber and permitting passage of ionic current during electroplating; and

(d) a getter comprising a solid phase getter material that undergoes a metal-metal displacement reaction or a selective ion exchange process when contacting ions of the second metal, wherein the getter is positioned to contact the anolyte but not contact the catholyte during electroplating,

wherein the getter is positioned at a first distance from the cathode chamber and the active anode is positioned at a second distance from the cathode chamber such that the first distance is greater than the second distance, and

wherein the getter is structurally distinct from the active anode.

2. The apparatus of claim 1, wherein the first metal is tin and the second metal is silver.

3. The apparatus of claim 2, further comprising a source of silver ions fluidically coupled to the cathode chamber.

4. The apparatus of claim 1, wherein the active anode comprises low alpha tin.

5. The apparatus of claim 1, wherein the separation structure comprises an ion selective membrane.

6. The apparatus of claim 1, further comprising an anolyte circulation loop fluidically coupled to the anode chamber and designed or configured to flow the anolyte through the anode chamber,

wherein the anolyte circulation loop comprises said getter and said getter is located outside the anode chamber.

7. The apparatus of claim 6, further comprising a circuit for connecting the active anode to the getter.

8. The apparatus of claim 6, wherein said getter comprises a filter having a wound structure comprising the getter material, and wherein the filter is designed or configured such that the anolyte flows through the wound structure when in operation.

9. The apparatus of claim 1, further comprising an anolyte circulation loop fluidically coupled to the anode chamber through an anode chamber inlet and an anode chamber outlet, wherein the anolyte circulation loop is designed or configured to flow the anolyte through the anode chamber,

wherein said getter is positioned between a location for the active anode and the inlet to the anode chamber,

further comprising a spacer for separating the getter and active anode from physical contact during electroplating.

10. The apparatus of claim 1, wherein the getter material comprises low alpha tin metal.

11. The apparatus of claim 1, wherein the getter is electrically isolated from the active anode.

12. The apparatus of claim 1, wherein the getter material comprises particles with a surface area per volume at least about 2 times the surface area per volume of the active anode.