CLAIMS

1. An inert metal oxide substrate comprising parent radioisotope immobilised on or within the inert metal oxide substrate in an amount effective to generate a medically useful dose of daughter radioisotope through a chain of spontaneous decay from the parent radioisotope via a gaseous intermediate radioisotope,

wherein at least some of the immobilised parent radioisotope is bound on or near the surface of the inert metal oxide substrate as a radioisotope surface layer to allow for effective emanation of the gaseous intermediate radioisotope away from the inert metal oxide substrate.

2. The inert metal oxide substrate of claim 1, wherein at least some of the immobilised parent radioisotope is bound on or near the surface of the inert metal oxide substrate as a heat-treated radioisotope surface layer.

3. The inert metal oxide substrate of claim 1 or claim 2, wherein the binding of the immobilised parent radioisotope on or near the surface of the inert metal oxide substrate is such that, in use, it enables the capture of a population of daughter radioisotope having a contamination level of parent radioisotope of less than about 5% expressed in activity terms relative to the activity of the daughter radioisotope.

4. The inert metal oxide substrate of any one of claims 1 to 3, wherein the inert metal oxide substrate has a porosity (vol. % based on the total volume of the inert metal oxide substrate) of less than about 10.

5. The inert metal oxide substrate of any one of claims 1 to 4, wherein the parent radioisotope is an alpha-emitting radioisotope, preferably wherein the parent radioisotope is a thorium radioisotope selected from thorium-227 (^{227}Th) or thorium-228 (^{228}Th),and the daughter radioisotope is a lead radioisotope selected from at least one of lead-211 (^{211}Pb) or lead-212 (^{212}Pb).

6. The inert metal oxide substrate of any one of claims 1 to 5, wherein the immobilised parent radioisotope is present in an amount effective to provide an activity (in MBq per cm^2 of inert metal oxide substrate surface) of between about 1 to about 1500.

7. The inert metal oxide substrate of any one of claims 1 to 8, wherein

at least some of the immobilised parent radioisotope forming the radioisotope surface layer is provided as a radioisotope-doped layer within the surface of the inert metal oxide substrate; and/or

at least some of the immobilised parent radioisotope forming the radioisotope surface layer is provided as one or more solid compound phases of the radioisotope bound on the surface of the inert metal oxide substrate.

8. The inert metal oxide substrate of any one of claims 1 to 7, wherein the radioisotope surface layer, heat-treated radioisotope surface layer, radioisotope-doped layer, solid compound, crystalline or amorphous phases each independently have a thickness of between about 0.1 nm to about 1000 nm.

9. The inert metal oxide substrate of any one of claims 1 to 8, wherein the inert metal oxide substrate is provided as a disk or slab.

10. The inert metal oxide substrate of any one of claims 1 to 9, wherein the metal oxide substrate is an oxide of tantalum, niobium, tungsten, molybdenum, vanadium, zirconium, titanium or aluminium, or mixed oxides thereof, preferably wherein the metal oxide substrate is tantalum pentoxide (Ta_2O_5) or zirconium dioxide (ZrO_2).

11. The inert metal oxide substrate of any one of claims 1 to 10, wherein the inert metal oxide substrate is provided as a layer on a metal substrate selected from tantalum, niobium, tungsten, hafnium, molybdenum, vanadium, zirconium, titanium or aluminium, or alloys thereof.

12. The inert metal oxide substrate of any one of claims 1 to 11, wherein the inert metal oxide substrate is produced by oxidatively pre-treating the surface of the metal substrate.

13. A radioisotope generator defining a chamber for producing and capturing a population of daughter radioisotope, the chamber configured to house an inert metal oxide substrate of any one of claims 1 to 12 in the chamber.

14. A system for producing and capturing a population of daughter radioisotope, comprising:

a) a radioisotope generator defining a chamber for producing and capturing a population of daughter radioisotope; and

b) an inert metal oxide substrate of any one of claims 1 to 12 housed in the chamber.

15. A process for producing and capturing a population of daughter radioisotope comprising:

a) allowing for the emanation of a gaseous intermediate radioisotope generated through a chain of spontaneous decay from a parent radioisotope immobilised on or within an inert metal oxide substrate of any one of claims 1 to 12; and

b) collecting at least some of the gaseous intermediate radioisotope for a period of time effective to decay into a daughter radioisotope.