CLAIMS

1. A radiotherapy source for treating a tumor, comprising:

a flexible core comprising a first polymer impermeable to radon;

a polymer coating on the flexible core, wherein the polymer coating comprises a second polymer impermeable to radium, and allows diffusion of radon therethrough; and

alpha-emitting radium radionuclides in the polymer coating or between the flexible core and the polymer coating.

2. The radiotherapy source of claim 1, wherein the flexible core has a diameter of at least 0.1 millimeters.

3. The radiotherapy source of claim 1, wherein the radiotherapy source has a bending moment of less than 5 Newton-millimeter (N*mm).

4. The radiotherapy source of claim 1, wherein the flexible core comprises Polyether ether ketone (PEEK).

5. The radiotherapy source of claim 1, wherein the flexible core has a thickness not greater than 0.3 millimeters.

6. The radiotherapy source of any of claims 1-5, wherein the radium radionuclides are dispersed throughout a thickness of the polymer coating.

7. The radiotherapy source of any of claims 1-5, further comprising small particles having a diameter of less than 100 micrometers dispersed in the polymer coating, wherein the radium radionuclides are coupled to the small particles.

8. The radiotherapy source of any of claims 1-5, wherein the flexible core and the polymer coating are not biodegradable for at least a week from implantation in a tumor.

9. The radiotherapy source of any of claims 1-5, further comprising a layer of manganese oxide on the flexible core, and wherein the radium radionuclides are coupled to the layer of manganese oxide.

10. The radiotherapy source of claim 9, further comprising a layer of parylene or silicone rubber, between the flexible core and the layer of manganese oxide.

11. A method for preparing a radiotherapy source, comprising:

mixing a solvent and solute to form a mixture which upon curing forms a polymer;

mixing alpha-emitting radium radionuclides into the mixture;

placing the mixture of radium and polymer components on a flexible core; and

allowing the mixture to cure into a polymer coating, after placing the mixture on the flexible core.

12. The method of claim 11, wherein mixing alpha-emitting radium radionuclides into the mixture comprises mixing a solution including radium radionuclides into the mixture.

13. The method of claim 12, further comprising removing excess liquid from the mixture, before placing the mixture on the flexible core.

14. The method of claim 11, wherein the flexible core comprises nitinol.

15. A medicament for treating a tumor, comprising:

small particles having a diameter of less than 100 micrometers, having an outer surface comprising a manganese oxide; and

alpha-emitter radium radionuclides on the outer surface of the small particles.

16. The medicament as in claim 15, wherein the small particles comprise a non-manganese-oxide core coated by manganese oxide.

17. The medicament as in claim 15, wherein the small particles comprise gold, titanium, titanium oxide, zirconium oxide and/or silicon oxide.

18. The medicament as in any one of claims 15-17, wherein the small particles have a diameter of less than 10 micrometers.

19. A radiotherapy source for treating a tumor, comprising:

a nitinol flexible core;

a polymer coating on the flexible core, wherein the polymer coating impermeable to radium, and allows diffusion of radon therethrough; and

alpha-emitting radium radionuclides in the polymer coating or between the flexible core and the polymer coating.

20. The radiotherapy source of claim 19, wherein the flexible core has a diameter of at least 0.1 millimeters.

21. The radiotherapy source of claim 20, wherein the flexible core has a thickness not greater than 0.3 millimeters.

22. The radiotherapy source of any of claims 19-21, wherein the radium radionuclides are dispersed throughout a thickness of the polymer coating.

23. The radiotherapy source of any of claims 19-21, further comprising small particles having a diameter of less than 100 micrometers dispersed in the polymer coating, wherein the radium radionuclides are coupled to the small particles.