

Licensable Technologies

Polymeric Chelators for Radioisotope Delivery Systems

Applications:

- Medical imaging
- *In vivo* cancer therapy
- *In vivo* diagnostics

Benefits:

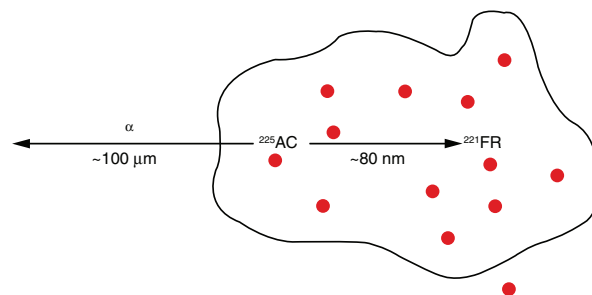
- Enables dose-tunable delivery system, increasing therapeutic efficacy
- Improves cytotoxic activity in specific area, with less damage to surrounding tissue
- Can be used directly with reactor-produced isotopes, decreasing the cost and time to market for many isotopes
- Highly specific for imaging, diagnostic and therapeutic applications

Contact:

David Pesiri, (505) 665-7279
 pesiri@lanl.gov
 tmt-1@lanl.gov
 Technology Transfer Division

Summary:

Los Alamos National Laboratory (LANL) researchers have developed polymeric chelators that can bind hundreds of atoms of radioisotope per complex. With this high binding capacity, the system can be adjusted in real time to acquire activity loading levels that are appropriate for individual treatments. This improvement means that these chelators enable a completely dose-tunable system; something impossible to achieve using the currently available technology. This technology provides an improved system for *in vivo* delivery of radioisotopes for diagnostics, imaging, and cancer therapy. The chelator system currently in use for isotope delivery binds only one atom of the radioisotope being used. This low capacity requires the use of very pure isotopes, which release daughter nuclei when the radioisotope begins to decay, causing damage to surrounding tissue. LANL's multi-atom binding, polymeric chelators retain and/or rebind daughter nuclei, increasing the cytotoxicity of the treatment at the target area and decreasing ancillary toxicity in surrounding tissue.



Polymeric chelator with multiple binding sites

In the event that high activity levels are not needed, the high binding capacity of polymeric chelators can be used with isotopically dilute media, which reduces the need for chemical or isotopic separations from reactor targets. Direct use of reactor-produced isotopes will facilitate bringing new isotopes to the market.

In addition to the therapeutic uses for the polymeric chelators, the research shows that this radioisotope delivery system vastly improves diagnostic and imaging capabilities. For *in vivo* utilization, the polymeric chelators can be attached to cell-specific targeting molecules such as proteins and monoclonal antibodies, or injected directly at the localized tumors as colloids, or otherwise immobilized.

This LANL-developed technology will greatly improve the efficacy and dosing of radioisotope cancer treatments, while decreasing unwanted side effects. Additionally, the polymeric chelators can be applied to diagnostics and imaging for more sensitive and specific results.

Development Stage:

The scientists working on this technology have proven that the chelator/metal contracts are stable to exchange with biological cations and that the polymeric chelators can be conjugated to targeting molecules. The system has not yet been proven *in vivo*.

Patent Status:

Invention disclosure submitted.

Licensing Status:

This technology is available for exclusive or nonexclusive field-of-use licensing.