Engineering *Deinococcus radiodurans* for Actinide Precipitation

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Deinococcus radiodurans is being developed for bioprecipitation and biostabilization of heavy metals and actinides with a bioprecipitation system capable of polyphosphate accumulation, inducible degradation, secretion, and actinide phosphate precipitation.

The effects of light-ion irradiation similar to actinide alpha radiation in aqueous suspension have also been studied; increasing lethality corresponding to increasing linear energy transfer (LET) of the radiation is seen.

The interaction of strain R1 with UO_2^{2+} has been studied and compared to engineered strains. The non-engineered uranyl sorption load is less than half of the engineered strains and more than hundredfold less than a polyphosphate accumulation engineered strain of *Pseudomonas aeruginosa*. Chemical studies of the cell-uranyl binding strength and pH sorption edges support spectroscopic data indicating that a carboxyl surface group, consistent with known characteristics of *D. radiodurans*' S-layer, interacts with and binds the uranyl. A strain engineered with the putative polyphosphate accumulation genes shows promise for use in applications of uranyl bioprecipitation and its efficacy and contrast to the non-engineered strain will be discussed.