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References:

Wu and Gorden, *J. Comb. Chem.* 2007, 9, 601-608.
(pdf)

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Reference: Uranium
detection



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Chemical System for Detection and Remediation of Uranium

Overview: Auburn University is seeking a licensee or development partner for a ligand-based technology for the detection and remediation of uranium and other actinides. This technology has potential applications in environmental engineering and homeland security.

Advantages:

- Changes color on binding of uranium, allowing for application as a sensor
- Strongly binds uranium, enabling functionality as a remediation or long-term storage solution
- Demonstrates negligible affinity for lanthanides, reducing false positives
- Demonstrates preference for uranium over copper, allowing for use in copper rich water
- Works in basic conditions unlike competing methods, allowing for broader application
- Utilizes simple synthesis process, keeping production costs relatively low
- May be applicable to other actinides, such as plutonium

Description: The nuclear fuel cycle and production of nuclear fuel materials are plagued with waste management risks that must be addressed. These environmental concerns have been thrust into the spotlight along with the threat of radiological weapons (e.g., a “dirty” bomb) or sabotage at a reactor site. A growing need exists for the development of new materials that can coordinate, sense, manipulate, and purify uranium and other actinides as the foundation of new technologies for waste reduction or sensors, “sensing” polymers, sprays, or pastes to detect and isolate actinides in decontamination applications.

In this invention, a ligand system incorporated into a salen backbone has been developed for the selective coordination of uranium metal ions. This ligand preferentially binds uranium, demonstrating a measurable color shift upon such binding. This would allow for development of a system for the visual and/or colorimetric detection of uranium and perhaps other actinides in a sample or in the environment. A variety of formulations, such as solutions or sprays, could be developed for different applications. Negligible binding over lanthanides such as cerium has been demonstrated. Currently known ligands that can bind uranium but not lanthanides do not have the benefit of a color change upon binding and also cannot function in basic conditions, such as those found in much of the plutonium waste controlled by the Department of Defense.

Status:

- U.S. Patent [8,445,678](#) which includes composition of matter claims
- Selective binding of uranium has been verified in the lab
- A solution-phase parallel synthesis method for the ligand has been designed and optimized
- This technology is available for exclusive or non-exclusive licensing
- Joint development opportunities include funded research or a joint venture

