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Use of Reduced Lipoic Acid Solutions for the Removal or Mitigation of Arsenic and Mercury Contamination

Background: Workers in a variety of industries including mining, farming, and manufacturing can be exposed to mercury and arsenic - metals with long term health effects. Conservators, curators, and others working with artifacts can also be exposed to these metals in the course of examining and handling objects.

Conservation scientists at the Arizona State Museum and the Department of Materials Science and Engineering, have developed a reduced lipoic acid solution to prevent mercury sorption or remove arsenic and mercury from contaminated materials. Lipoic acid is a naturally occurring chemical present in plants and mammals.

Applications:

- *Health care products used to prevent the sorption of mercury*
- *Skin care products used to remove mercury and arsenic*
- *Removing arsenic from materials contaminated with arsenic pesticides*

Advantages:

- *Simple, inexpensive process to produce reduced lipoic acid resulting in lower treatment costs*
- *The lipoic acid used to generate the solution for binding arsenic or mercury is naturally occurring, and is readily available since it is used in a variety of applications and industries*
- *This approach permits production of reduced lipoic acid solutions in a relatively inexpensive manner which could readily be increased in scale*

The Technology: Lipoic acid is first formulated as an alkaline aqueous solution, and then reduced with ultraviolet light to generate the desired solution. This reduced lipoic acid solution can then be applied directly to materials in a three-step process. This process removes arsenic from contaminated materials, and removes mercury from non-sulfur containing materials. The reduced lipoic acid solution is also effective at preventing mercury binding to materials. The method has been shown to be effective with model systems such as sodium arsenate.

Lead Inventors: Peggi S. Cross, PhD; Prof. Nancy N. Odegaard; and Prof. Mark R. Riley

Stage of Development: A laboratory-scale, proof-of concept, evaluation has been completed.

Status: Provisional patent application

Refer to Case # UA07-097 and UA07-098
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