Radioactivity-Related Examples of Nano-4-Rem

1. Bacteria-enhanced cleanup of uranium
2. Graphene removal of uranium and plutonium from liquid streams
3. New EM tools for discovery and research

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Informatics considerations for Customers, Creators, Curators, and Analysts

Example 1: Bacteria-enhanced cleanup of uranium

- A June 17, 2015, Rutgers study reports that bacteria could help clean groundwater contaminated by uranium ore processing
- Mechanism of action: making uranium non-motile

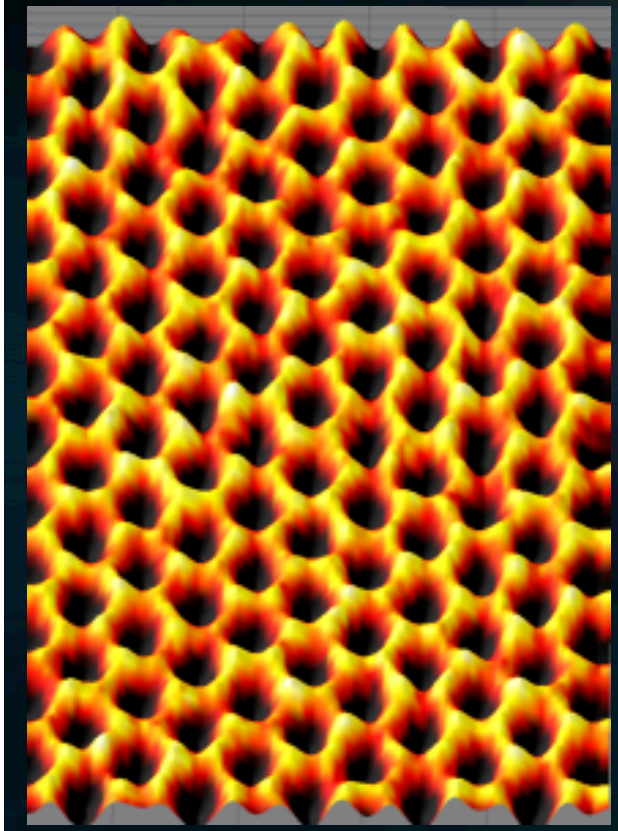
"It appears that [the bacteria] form uranium nanoparticles," Kerkhof said,
but the mineralogy is still not well known
and will be the subject of ongoing research.

Example 2: Graphine removal of uranium and plutonium from liquid streams

- Mechanism of action:
  - extremely large surface area for adsorption
  - favourable surface chemistry for retention

Collected material can be retained in situ, removed for safe disposal, or recovered for reuse

Tools for discovery and research are improving



- *First time ever image recorded at Berkeley Lab's National Center for Electron Microscopy (NCEM).*
- *This DOE national user facility that is a premier center for electron microscopy and microcharacterization.*
- *TEAM 0.5, its newest instrument, is capable of producing images with half-angstrom resolution, which is less than the diameter of a single hydrogen atom.*
- *"Simply put, TEAM 0.5 is the best transmission electron microscope in the world, representing a quantum leap forward in instrumentation," said physicist Alex Zettl who led this research.*