

Virtual IARPA TEI-REX Proposers' Day

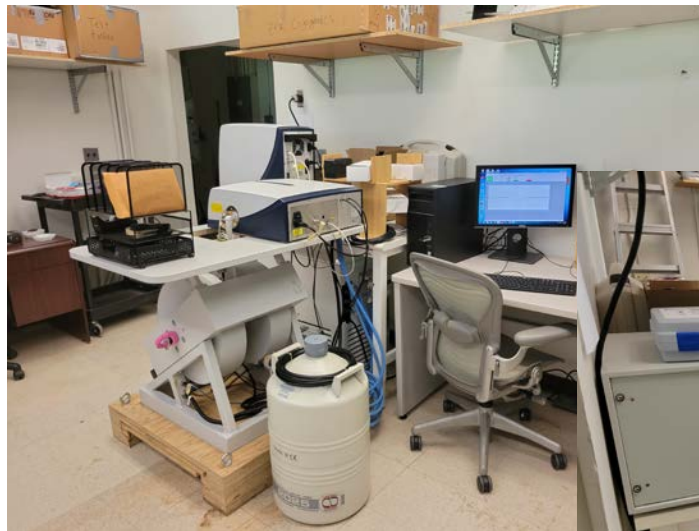
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[Radiological Detection and Nuclear Assay](#)

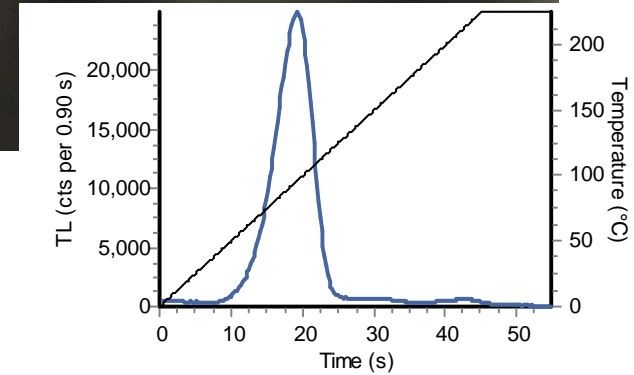
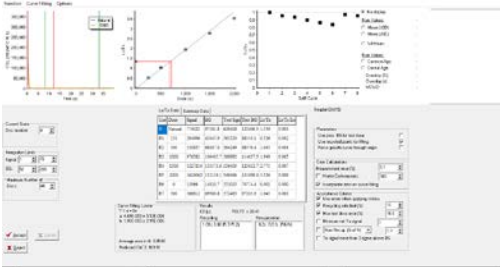
Wed, Sept 29

Electron Paramagnetic Resonance (EPR)

- A free radical is simply an unpaired electron
- Identical physics to that of NMR but EPR sees free radicals rather than free protons
- EPR is a nondestructive means to measure free radicals in a solid.



TL/OSL



EPR biosimetry examples

- **Antlers** which unlike horns are annually shed by fauna allowing regional biosimetry
- **Walrus tusks** which can give results on underwater nuclear activities with which they have contacted or other arctic conditions
- **Shells, mollusks and snails** can provide regional historical radiological conditions
- **Plastic materials** can be used but generally have low sensitivity and short (days to weeks) half lives and vary from one material to another

Thermal and Optically Stimulated Luminescence Biodosimetry Examples

- All insulator materials on a person which have a crystalline structure
 - This does require samples to be largely **translucent**
- Silica type materials including natural quartz, quartzite, feldspars and zircons
 - **Dirt** from money including both paper and coin
 - This requires silica components which have been light shielded
 - **Natural rocks**
 - This requires the accumulated natural background is small or comparable to the dose of interest

Solid State Biodosimetry

based on published research

EPR

- Tooth enamel biopsy
 - Requires dentist rather than phlebotomist/nurses
- Confectionary
 - Requires edibles
- Fingernails
 - Low sensitivity and transients
- Buttons
 - Not well characterized

TL/OSL

- Watch PC board
 - Destructive unless reassembling watch
 - Sample preparation requires further research
- Surface mount resistors in personal electronics
 - High sensitivity but requires sufficient electronic components and is in principle destructive

