



Stable Isotope Forensics and Attribution of Chemical-Biological-Nuclear Materials

- **Goal:** Current methods for chemical/biological/nuclear materials identifications are insufficient to determine the source of the materials. Naturally-occurring stable isotopes of light elements (hydrogen, carbon, nitrogen, oxygen, sulfur, *etc.*) can serve as built-in bar-codes for forensics and attribution in the event of terrorist attacks. To meet this goals, four areas of R&D are focused in order to develop a stable-isotope fingerprinting system of CBN materials for safeguard and forensic applications:
 - Rapid procedures for sample collection and handling
 - Advanced methods of isotopic analysis
 - Developing database of “stable-isotope fingerprints”
 - Statistical procedures and information system for forensic attributions
- **Accomplishments:**
 - Proved the hypothesis that bacteria possess “stable-isotope fingerprints,” depending on their growth media and culture conditions (Horita and Vass, *J. Forensic Sci.* 48, 122, 2003).
 - Developed rapid & accurate methods for isotopic analysis of biological materials
 - Developed protocols for purifying and handling biological weapons (ricin, anthrax, *etc.*)
 - Acquired first sets of “isotope fingerprints” for biological and nuclear materials
- **Future work:**
 - Develop extensive “isotope fingerprints” for biological weapons (ricin, anthrax, yellowcakes, *etc.*)
 - Develop statistical and GIS-based method for forensics and attribution
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