Title: How SIMS safeguards against the proliferation of nuclear weapons

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Secondary ion mass spectrometry (SIMS) is one of the most powerful tools used by the International Atomic Energy Agency (IAEA) to detect possible indications of undeclared nuclear material and/or activities. IAEA inspectors utilize this and other tools to make technical verification assessments in States that are party to the Treaty on the Non-Proliferation of Nuclear Weapons, which is the centerpiece of global efforts to prevent the spread of nuclear weapons. Environmental sampling, where small amounts of ambient dust are collected on cotton swipes in nuclear facilities, relies on highly-sensitive analytical techniques to determine the isotopic composition of microscopic uranium particles within the dust. Large-geometry SIMS (LG-SIMS) is the perfect tool due to its combined ability to find uranium particles in a sea of ambient dust using the automated particle measurement (APM) functionality, and then to analyze the uranium particles of most interest for the major and minor U isotopes with high accuracy and precision. The majority of environmental sample analyses are conducted by the IAEA's Network of Analytical Laboratories (NWAL) which are located in 13 Member States worldwide. Due to the increased number of facilities that have come under IAEA Safeguards in the last 10 years, there has been a sizeable increase in the number of environmental samples taken by inspectors. Since demand is expected to continue to grow, the IAEA is looking to expand its NWAL for environmental sample analysis, and is reaching out to the LG-SIMS community and Member State governments to solicit new candidate laboratories for NWAL membership.