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Time-of-Flight Secondary Ion Mass Spectrometry of Inorganic Materials: Understanding and Quantification with more Information to Explore.

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Time of Flight SIMS is extraordinarily sensitive for surface analysis and especially useful for detection and identification of molecular species. This has been applied successfully for organic materials with impressive results on a broad range of materials.

However, data obtained from inorganic materials, specifically crystalline minerals and glasses has not been explored to the same extent. Modern ToF-SIMS instruments have several ion beams that can be used for material-removal by sputtering and often more than one mode in which to operate the pulsed analysis ion beam. By varying the combination of operating modes and sputter-beams much more information can be obtained from materials than has been previously by magnetic-sector, or quadrupole SIMS. In addition, one ToF-SIMS instrument at Corning, has been equipped with a charge compensation electron gun that can operate at energies up to 300 eV that can be used for inorganic material analysis and depth profiles where charging conditions can change throughout the analysis in such a way that lower energy charge-compensation (used for organic surface analysis) would be inadequate.

Examples of what can be done and what new information can be obtained with the newest generation of ToF-SIMS instruments for inorganic materials will be shown and described. These newer instruments and novel methods will hopefully bring about a new world of inorganic materials to explore and understand.