

ToF-SIMS Instrument at Rice University

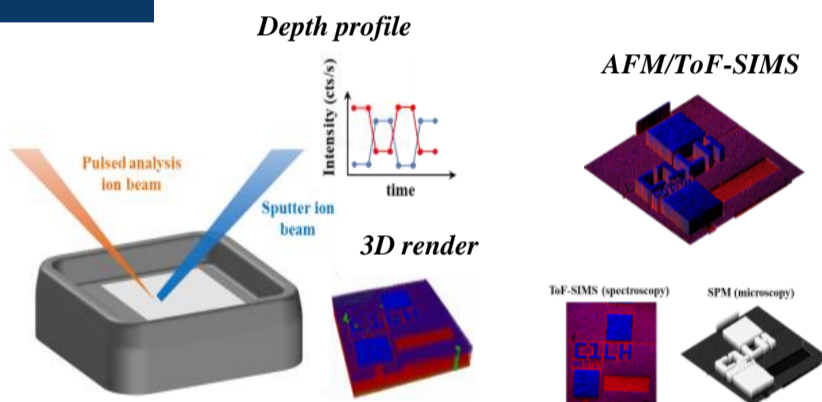
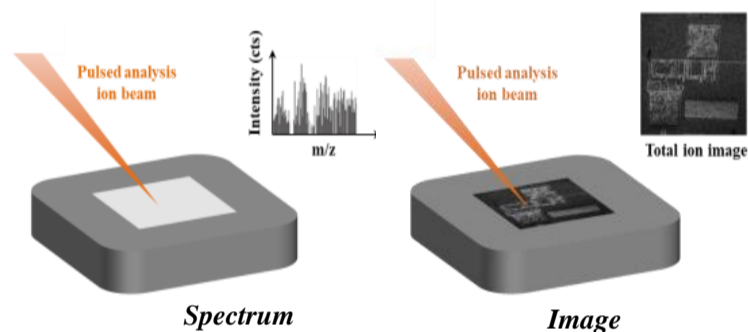
The new ToF-SIMS instrument combines a **Time-of-flight Secondary Ion Mass Spectrometer** with an **Atomic Force Microscope**. The ToF-SIMS lab offers an experimental facility for sample analysis via ToF-SIMS and/or AFM, including user training and support for sample preparation and analysis. The lab is available to academic and industrial researchers through the Shared Equipment Authority (www.sea.rice.edu).

Instrument Configuration & Options

- ❖ *In-situ* AFM Combination
 - Bi Nanoprobe (ultimate lateral resolution)
 - Argon Gas Cluster Ion Source
 - Dual Source Column (O₂ and Cs)
 - Extended Dynamic Range Analysis
- Fast Sample Rotation
- Sample Heating and Cooling
- Transfer Vessel
- Special Sample Holders



ToF-SIMS/AFM features & performances



❖ Surface Spectrometry:

- **Elements Detected:** Full periodic table (including isotopes), plus molecular species
- **Sensitivity:**
 - High mass resolution and accuracy even on insulating samples (typically $m/\Delta m > 10,000$)
 - High mass range (m/z 0 – 12,000 a.m.u)
 - Detection limit: 1 ppm -10 ppb
 - Ideally suited for analysis of inorganic, organic or hybrid and biological, conductive/insulating materials

❖ Surface Imaging:

- High lateral resolution (≈ 70 nm)
- Fast image acquisition (up to 50 kHz pixel frequency)
- Field of view from μm^2 to cm^2

❖ Depth profiling:

- Depth resolution better than 1 nm
- Sputter speed of up to $10 \mu\text{m}\cdot\text{h}^{-1}$
- Ideally suited for insulators

❖ 3D Volume Analysis

❖ Retrospective Analysis

❖ Correlative Analysis with *in-situ* AFM

Applications in ToF-SIMS analysis

