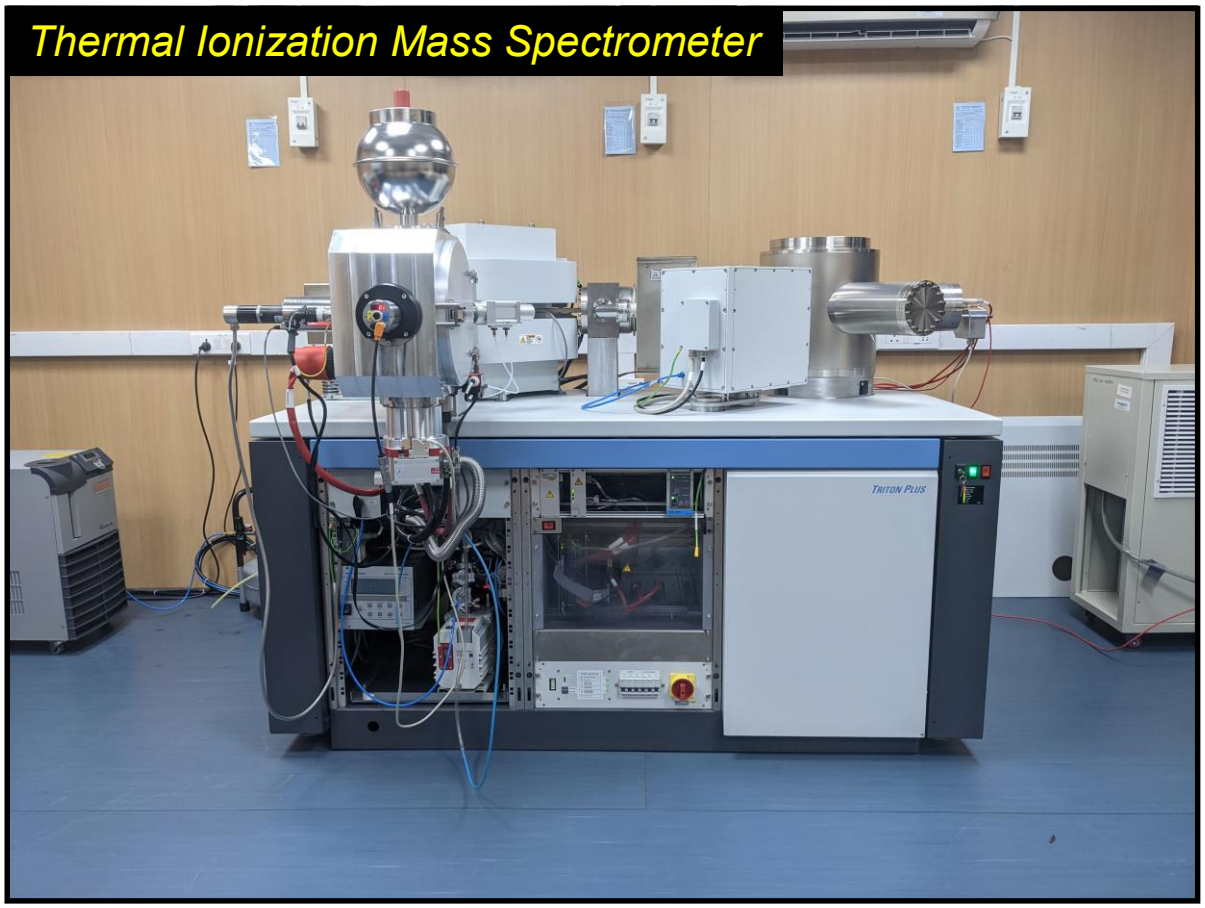
TIMS @ PRL



The Thermal Ionization Mass Spectrometer (TIMS) is a sophisticated solid source mass spectrometer that can measure very precise isotopic ratios for their applications in various research areas (Geochronology, oceanography, geochemistry).

In TIMS, the ions are generated by thermally ionizing the samples, usually by passing a current through a thin metal ribbon (on which samples are deposited) under vacuum. The ions generated from the ribbon(s) are accelerated across an electrical potential gradient (~ 10 KV). Subsequently, the ions are passed through a series of slits, and electrostatically charged plates, focusing the beam into an ion beam. This ion beam is then passed through a magnetic field, and the original ion beam is dispersed into separate beams on the basis of their mass-to-charge ratio. These mass-resolved beams are then directed into collectors, where the ion beam is converted into voltage. Comparison of voltages corresponding to individual ion beams yields precise isotope ratios.

The major advantages of the TIMS technique include stability of the ionization process (gently heating the filaments to produce ions), extremely precise isotopic ratio measurements, very low detection limit, and relatively low and highly consistent instrumental mass fractionation. Further, using the isotope dilution method, accurate and precise trace element determinations (to very low levels) can be done using the TIMS.

The TIMS at PRL has been used to understand various earth system processes and their timings, including understanding the age of the rock formation, assessing the source of the weathered material on the earth's surface, understanding the water mass circulation in the ocean.