

Development of Frequency Transfer and Dissemination Methods Using Optical Fibers

An economical remote calibration technique is being developed using existing synchronous optical fiber communication networks. The measured frequency stability (the Allan deviation) is 1×10^{-12} for an averaging time of one day. The result shows the method is promising for the simple frequency calibration service. An ultra precise two-way optical fiber frequency transfer method is also under development for ultra-stable future atomic clock comparison.

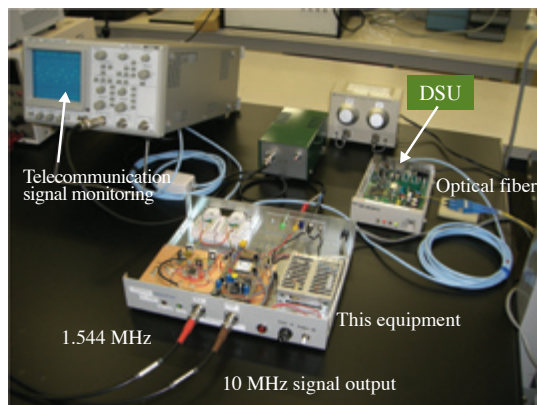


Figure 1: Prototype of the network lock oscillator for the simple remote calibration service.

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Time-of-Flight Mass Spectrometry with an Ion Attachment Ionization Technique

We have developed a new mass spectrometry based on a time-of-flight mass spectrometer combined with an ion attachment ionization technique (IA-TOF). An alkali ion attachment scheme can ionize organic molecules without producing fragment ions. The adduct ions distributing over a wide mass range can be investigated with a high mass resolution by time-of-flight mass spectrometers. A tabletop IA-TOF system was developed and applied to typical specimens in a gas-phase as well as in a solid-phase as a performance test. We have succeeded in a fragment-free ionization and a mass analysis with a high mass resolution over a wide mass range. The IA-TOF realizes an accurate and versatile real-time analysis.

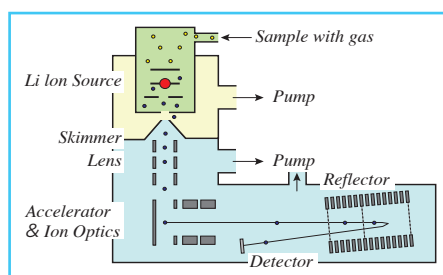


Figure 1: A schematic view of the IA-TOF system.

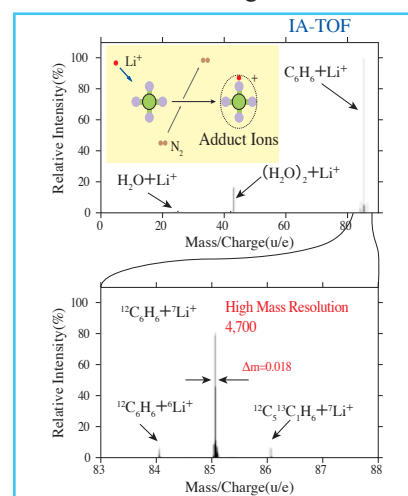


Figure 2: Typical mass spectra of benzene (C_6H_6) diluted by N_2 gas. We have succeeded in a fragment-free ionization and a mass measurement with a high mass resolution.

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