



B17 Laser Ablation/Pulsed-Field Reflection TOF-MS Analysis and Discrimination of Forensic Soil

Sung-Woo Park, PhD, Eun-Ho Kim, MS, National Institute of Scientific Investigation, 331-1 Shinweol-7-Dong, Yangcheon-ku, Seoul, 158-707, South Korea; Il-Kwang Kim, PhD, Department of Chemistry, Wonkwang University, 344-2 Shinyong-Dong, Iksan, Jeonbuk, 1, Korea; Kwang-Woo Jung, PhD, Department of Chemistry, Wonkwang University, 344-2 Shinyong-Dong, Iksan, Jeonbuk, 1, Korea*

After attending this presentation, attendees will learn how to analyze and discriminate forensic soil evidence using Laser Ablation/Pulsed-field Reflection TOF-MS.

This presentation will introduce a new method of analyzing and discrimination of soil samples by using Laser Ablation/Pulsed-field Reflection TOF-MS.

This presentation will discuss how to analyze and discriminate forensic soil evidence using Laser Ablation/Pulsed-field Reflection TOF-MS.

Soils vary with areas and have distinct characteristics due to natural effects and the residues of leaves and living things. Due to complex variations in compositions, several examination techniques and instruments should be used for analyzing soil samples. In most cases, physical examinations of color reaction, a polarization microscope, etc and instrumental analyses of XRF and SEM-EDX have been used to discriminate forensic soil samples.

In this study to discriminate soil evidences, 30 soil samples were collected from 30 different locations in Republic of Korea and were analyzed using Laser Ablation/Pulsed-field Reflection TOF-MS.

All samples were reduced to powders and then were made into pellets (ID 0.8mm). The samples were heated for 5 hours at 500° C before loading on the holder. The Nd:YAG laser light ($\lambda=532$ nm) was used to ablate the components of soil. The mass spectrum was obtained by averaging of repeated pulses of 2000 times checked by Oscilloscope. The ablated main elements were sodium (Na), aluminum (Al), potassium (K), titanium (Ti), iron (Fe), copper (Cu) on the Mass spectrum. The ratios, (Al)/(Ti) and (Fe)/(Ti), showed reproducibility and different results with the soils prepared from the different locales. It could confirm that these results can be used for forensic soil examinations and supported to other analyses: data obtained by a polarization microscope and SEM-EDX, and so on. The isotope ratio for Titanium (the ratio of 45.95amu to 46.95amu) also showed another useful criterion to discriminate soil samples. This data gave the same results as the ones analyzed by the ratios of components.

Thus, these could be useful techniques to discriminate forensic soil samples by comparing both the component ratios, (Al)/(Ti) and (Fe)/(Ti), and Isotope ratio of Ti. Applications were also carried out on forensic soil evidence submitted from the police's. It showed much more definite results compared by the ones obtained by routine analyses with a polarization microscope and SEM-EDX.

It was concluded that analyzing soil evidence by Laser Ablation/Pulsed-field Reflection TOF-MS could be a useful technique to identify forensic soil evidence.

Forensic Soil Evidence, Laser Ablation/Pulsed-Field Reflection TOF-MS, Mass Spectrum