CHARACTERIZATION OF LAYERED MATERIALS RELATED TO FORENSIC INVESTIGATION BY CONFOCAL MICRO-XRF AND ATR-FT-IR IMAGING TECHNIQUES

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Micro-X-ray fluorescence (micro-XRF) analysis is a promising method for determining elemental distributions of small regions. Moreover, a recent trend in micro-XRF is 3D elemental analysis by using confocal micro-XRF instruments combined with two polycapillary x-ray lenses. Our research group has been developed confocal micro-XRF instruments by using polycapillary x-ray lenses, and its spatial resolution (depth resolution) was 13.7 micro-meters at an energy of 11.4 keV (Au Lb) [1]. The confocal micro-XRF nondestructively provides elemental depth information, and has been used for analysis of forensic samples with a layer structure [2]. The elemental distribution in each layer was clearly shown, and yet, information on molecular species could not be obtained by this method. On the other hand, attenuated total reflectance FT-IR (ATR-FT-IR) is one of the methods for obtaining information on molecular species in micro regions. In addition, ATR-FT-IR imaging technique can be used to observe spatial heterogeneity of samples on a micro scale [3]. In this work, layered forensic samples were measured by using two techniques in combination, i.e., confocal micro-XRF for elemental distribution analysis, and ATR-FT-IR imaging technique for molecular speciation of each layer. Two analytical techniques appeared to be useful for the detailed characterization of layered structure.

References