

Application of XRF and Other Principal Component Analysis for Counterfeited Gold Coin Characterization in Forensic Science

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Abstract : At world market can be currently encountered a wide range of gemological objects that are incorrectly declared, treated, or it concerns completely different materials that try to copy precious objects more or less successfully. Counterfeiting of precious commodities is a problem faced by governments in most countries. Police have seized many counterfeit coins that looked like the real coins and because the feeling to the touch and the weight were very similar to those of real coins. Most people were fooled and believed that the counterfeit coins were real ones. These counterfeit coins may have been made by big criminal organizations. To elucidate the manufacturing process, not only the quantitative analysis of the coins but also the comparison of their morphological characteristics was necessary. Several modern techniques have been applied to prevent counterfeiting of coins. The objective of this study was to demonstrate the potential of X-ray Fluorescence (XRF) technique and the other analytical techniques for example SEM/EDX/WDX, FT-IR/ATR and Raman Spectroscopy. Using four elements (Cu, Ag, Au and Zn) and obtaining XRF for several samples, they could be discriminated. XRF technique and SEM/EDX/WDX are used for study of chemical composition. XRF analyzers provide a fast, accurate, nondestructive method to test the purity and chemistry of all precious metals. XRF is a very promising technique for rapid and non destructive counterfeit coins identification in forensic science.

Keywords : counterfeit coins, X-ray fluorescence, forensic, FT-IR

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