## B44 Examination of Counterfeit Hong Kong $10 Bimetallic Coins

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After attending this presentation, attendees will learn a general guideline of examination involving the physical parameters and surface features in examination of bimetallic coins.

This presentation will impact the forensic community and/or humanity by providing an examination guide on bimetallic coins including the core-extrusion method which is an effective and reliable supplementary method of examination. Moreover, the core-extrusion method may also be applied to coins with similar construction.

This poster presents a number of important physical parameters, such as surface features of the genuine bimetallic HK$10 coins which can be utilized for the examination of counterfeit coins.

The Hong Kong ten-dollar coin was introduced into common circulation by the Hong Kong Monetary Authority towards the end of 1994. However, just within six month after launching, counterfeit HK$10 coins started to be found in the region. The first case of counterfeit HK$10 coins was delivered to the Hong Kong Government Laboratory in the summer of 1995. Since then, there were significant increases in the number of cases and the actual number of coins submitted for examination. The quality of counterfeit ten-dollar coins which were first found was crude. They displayed significant difference, both in physical dimension and/or surface features, to the control specimen. However, as time progressed, forgery techniques appeared to have improved to such an extent that counterfeit HK$10 coins were almost indistinguishable to the untrained eye from the corresponding control coins.

General guidelines for the examination of HK$10 coins are as follows:
1) The physical parameters of the coin, such as weight and dimensions (thickness and/or overall diameter) are measured, but as the physical parameters of counterfeit coins can most easily be reproduced within a reasonable level of accuracy, thus they would not provide a sound indication of authenticity.
2) The surface and edge characteristics of the counterfeit coin are scrutinized and compared with genuine coins. For example, the color of the bimetallic part is distinctly different from the control specimen, the bonding between the core and the annulus is rough usually; the inscribed words are of different fonts; the milling is poor; the Bauhinia logo lacks clarity and details. In most of the cases, visual examination would normally be sufficient to distinguish a counterfeit coin from a genuine control.
3) Determination of the metal composition of the coins can also be used. Accurate results can be obtained using such techniques as Atomic Absorption Spectroscopy (AAS) or Inductively-coupled Plasma-Atomic Emission Spectrometry (ICP-AES). However, these techniques are destructive, labour-intensive and timeconsuming as they involve pre-treatment of sample. An alternative method being used is the Scanning Electron Microscope (SEM) – a non-destructive, reasonably accurate technique that requires minimal sample treatment.

Recently, an effective physical method (core-extrusion method) has been developed in the authors' Laboratory. It makes use of the construction of the coins itself. The HK$10 coin is bi-metallic consisting of a core made of nickel-brass with a cupro-nickel annulus. The two metallic parts are held together by a physical construction consisting of a groove at the outerperimeter of the core and a rim at the inner perimeter of the annulus. Therefore, for the genuine coin, a greater force exerted by way of a hydraulic press on the core will be required to separate it from the annulus rim. By comparison that required for separating the core and the rim of a counterfeit coin is only 20% of that for the genuine counterpart.

By far the most time-consuming step in the analysis of HK$10 coins is the metal-composition determination. Whereas the most effective way to distinguish a counterfeit HK$10 coin would be visual examination of the surface features, such as the Bauhinia and the word fonts. Moreover, the core-extrusion method also serves as an effective and reliable supplementary method of examination. The latter method may also be applied to coins with similar construction.

**Counterfeit, Bimetallic, Coins**