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APPLICATION NOTE

5: IDENTIFYING COUNTERFEIT COINS USING ECCO

ECCO
Elemental Composition Comparator

£1 Coins

Introduction

The number of counterfeit £1 coins in circulation in the UK has risen steadily over the last few years, probably because of the ease with which coins can now be counterfeited compared with paper banknotes. Whilst close visual inspection (inconsistencies in the date and design, poor quality of less prominent features, incorrect dimensional tolerances) can often be used to identify counterfeit coins, such methods are not entirely reliable.

Recent studies have been reported, however, in which counterfeit coins can be detected by elemental analysis [1]. The presence or absence of specific trace elements can often distinguish genuine coins from counterfeit.
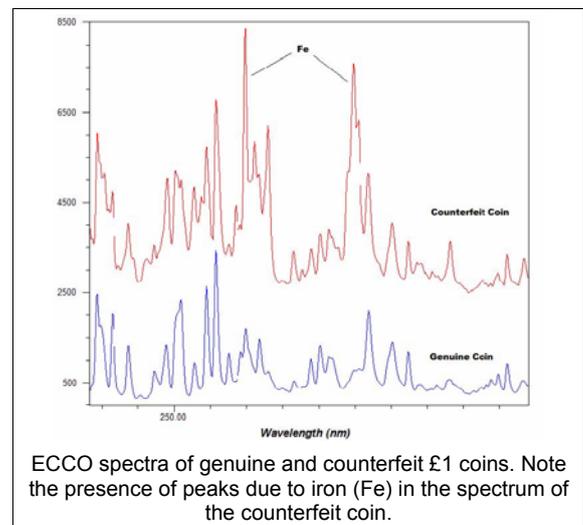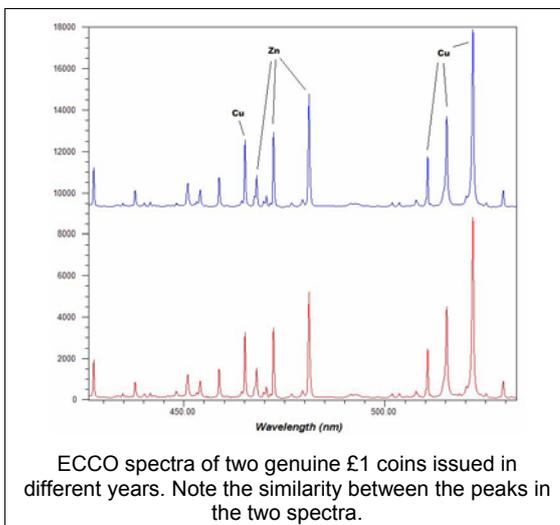
In this Application Note, a number of different coins are examined using the ECCO.

The ECCO relies on the technique of Laser Induced Breakdown Spectroscopy (LIBS) and involves the generation of optical emission spectra from the target material that are characteristic of its elemental composition.
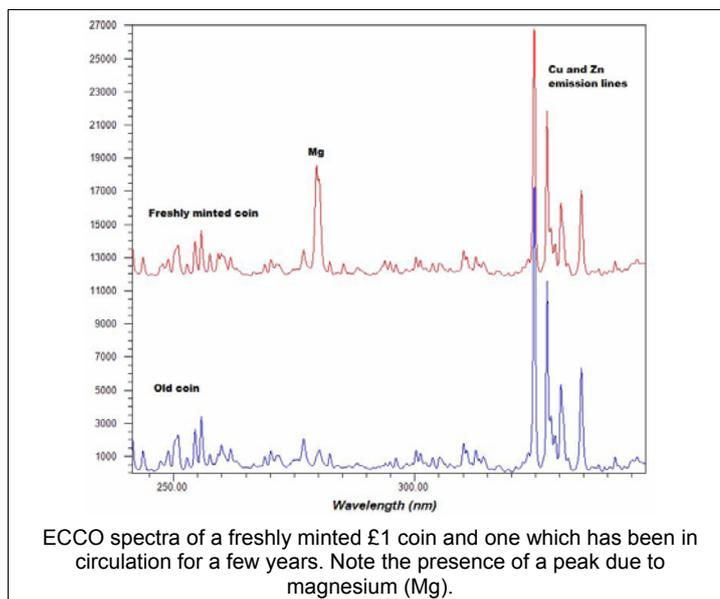
Coins

The study reported here involved subjecting genuine and counterfeit £1 coins to analysis using the ECCO.

Results

ECCO spectra of two genuine £1 coins issued in different years. Note the similarity between the peaks in the two spectra.

ECCO spectra of genuine and counterfeit £1 coins. Note the presence of peaks due to iron (Fe) in the spectrum of the counterfeit coin.

ECCO provides the user with a spectral "fingerprint" of the elemental composition of the target material, in this case the metal of the coins. The heights of the characteristic peaks in the ECCO spectrum are a measure of the concentration of the corresponding elements contained in the material.

The spectra of the two genuine £1 coins, issued in different years, show prominent peaks due to the principal elemental constituents, copper (Cu) and zinc (Zn). The spectra do not appear to change significantly between years of issue. The presence of peaks due to iron (Fe), however, clearly identifies the counterfeit coin.

ECCO spectra of a freshly minted £1 coin and one which has been in circulation for a few years. Note the presence of a peak due to magnesium (Mg).

It is surmised that the presence of a peak due to magnesium (Mg) in the freshly minted coin arises from the use of a magnesium-containing surfactant to aid feeding of the blanks during the minting process.

Conclusions

The ECCO provides a fast and effective method for discriminating between genuine and counterfeit £1 coins. It is possible that the ECCO can also be used to detect counterfeit high value coins issued by other countries.

Unlike other elemental analysis techniques, the ECCO requires very little sample preparation. The instrumentation is cost effective, compact and almost free of maintenance.

References

[1] H.H. Meng, K.C. Cheng and H.S. Chen, Forensic Science Journal, 2002; 1; 39-46.

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