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Provenance studies of Kościuszko banknotes : one of the oldest paper banknotes in Europe : using Raman spectroscopy in conjunction with other analytical techniques.

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Streszczenie

The aim of this study was to establish the provenance of materials used in the manufacturing process of the *Kościuszko banknotes*. The applied methodology is mostly based on Raman investigations carried out using portable and benchtop instruments. Raman analysis allowed to identify smalt, an optical brightener typically used in paper production in the Netherlands. This result was also confirmed by X-ray fluorescence spectrometry and scanning electron microscopy coupled with energy dispersive X-ray spectrometry. The Raman investigation of ink and dyes was supported by Fourier transform infrared spectroscopy analysis and high-performance liquid chromatography. The detection of typical local dyes such as reseda (*Reseda luteola L.*) and madder (*Rubia tinctorum L.*) suggested that the paper was dyed in Poland. The results also indicate the use of charcoal with an admixture of traces of bone black. Finally, a two-step manufacturing process was identified. The paper was imported and then dyed and printed in Poland, instead of the original assumption, which was that the paper was manufactured and mass dyed abroad and the banknotes were later printed in Poland.

Słowa kluczowe

HPLC, micro-Raman, portable Raman, printing ink, smalt

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