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Some new improvements of portable micro energy dispersive X-ray fluorescence spectrometer

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Statement of the Problem: Due to the irregularity or curvature of the surfaces of samples, the distance between irradiation spot of samples and exit of polycapillary optics is various in the process of scanning by μ -EDXRF. It will cause the irradiation spot of samples is not on positions of the focused spot of X-rays. As a result, the accuracies of measurements and the resolutions of elemental mappings of scanning areas will reduce.

Methodology & Theoretical

Orientation: We employed Laser Displace Sensor (LDS)

in our portable micro energy dispersive X-ray fluorescence spectrometer to automatically control the distances between the irradiation spot of sample and exit of polycapillary X-ray optics in order to decrease the errors caused by the irregular or curving surfaces of samples. In order to test the feasibilities of this spectrometer, the elemental mappings on the irregular colored glaze of a piece of ancient porcelain, which the height difference is nearly 5mm were scanned by this portable micro-X-ray fluorescence spectrometer.

Conclusion & Significance:

LDS can automatically control the distances between the irradiation spot of samples and exit of polycapillary optics so that the irradiation spot of samples is on the positions of the focused spot of X-rays.

It means that the sizes of the irradiation spot of samples will be constant while the irregular surfaces of samples are scanned by μ -EDXRF. Consequently, it could effectively reduce measurement errors caused by irregularity or curvature of the sample surface. In the other hand, the sizes of 4mm \times 4mm micro area on the RMB 5 jiao coin's surface was scanned by this spectrometer also, the distributions of Cu, Sn, and their alloys' crystal phases were got after data processed. From the results, it can be included that this spectrometer can not only perform micro energy dispersion X-ray fluorescence analysis (μ -EDXRF) but also perform micro energy dispersion X-ray diffraction analysis (μ -EDXRD).

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