

# Development and performance test of X-ray Source for industrial Benchtop & Handheld XRF

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X-ray fluorescence (XRF) spectrometry is a non-destructive method used to analyze elements within materials quantitative and qualitative [1]. The XRF is widely used in industries such as steel and mining industry, material research, and nondestructive inspection. Presently, the foreign companies' X-ray source of XRF and XRD equipment are mostly used.

The research for the X-ray source development has actively conducted to develop source technology and strengthen technology competitiveness. The XRF spectrometry consists of four parts: X-ray tube, High voltage, Detector and Analysis software. In this study, high output X-ray tube for Bench-top & Handheld is developed based on  $\Phi 8$  Ceramic X-ray tube which is used for soft X-ray ionizer.

First, Anode and Cathode structures were newly designed to increase tube voltage to 50kV and reduce focal size. Second, the optimum thicknesses of W and Ag target materials were determined by using the mcnp code [2]. Third, the energy spectrum and radiation amount of X-ray tube was measured using the CdTe detector [3]. Finally, the component analysis of five materials was conducted using the SDD detector. The performance of a X-ray tube was verified through the comparison between the analyzed results and the actual composition ratio.

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[3] Redus, R.H., J.A. Pantazis, T.J. Pantazis, A.C. Huber, and B.J. Cross, "Characterization of CdTe detectors for quantitative X-ray spectroscopy", IEEE Trans. Nucl. Sci., 2009, pp 2524 – 2532.