Analysis Of Water Trees In Underground HV Cables Using The KFUPMmicro-PIXE Facility

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Summary

Scanning with the micro-PIXE technique was employed to analyze water trees in the XLPE insulation of a field-aged underground HV cable. X-ray spectra of bow tie and vented water trees, the inner and outer semiconductive compounds, and an insulation spot free from any water tree were acquired. Simultaneously, two-dimensional elemental distribution profiles across the water trees were also measured. Various trace element impurities were identified in the analyzed spots and their possible sources are suggested. Differences in elemental distribution profiles in the scanned areas were observed and have been discussed on the basis of the mechanism of incorporation of these elements into the insulation. This study demonstrates the effectiveness of the micro-PIXE facility available in this laboratory in analyzing water trees in underground power cables