The Kα12 X-ray line widths in Ca ~ Ge elements

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For a long time, 3d elements have been focused on the investigation of the spectra by x-rays in its necessity for applications and pure science. It is well known that the profile of the Kα emission lines in 3d elements has an asymmetry. Berger [1] first proposed to fit the shape of Cu Kα\textsubscript{12} lines by each two Lorentzian as a simple model of the analysis. According to the description of the profiles by two-Lorentzian model, Ito et al. [2] and Polasik et al.[3] investigated the emission line shape in Ti ~ Zn elements and concluded that the FWHM of the Kα\textsubscript{11} which corresponds to Kα\textsubscript{1} line increases from Ti ~ Zn as compared with theoretical one reported by Krause and Oliver [4]. Moreover, Ito et al. [2] suggested that Kα\textsubscript{21} to Kα\textsubscript{2} line, shows a different aspect which may be ascribed to the L\textsubscript{2} − L\textsubscript{3}\textsubscript{M\textsubscript{4,5}} Coster-Kronig transition.

In the present study, we have tried to measure and analyze the Kα\textsubscript{12} spectra in Ca ~ Ge elements systematically using Berger’s model in a high-resolution anti-parallel double-crystal x-ray spectrometer in order to elucidate the physical meaning of the asymmetry in the spectral profile in more details.


