

X-ray standing wave technique applied in the characterization of periodic multilayers

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Abstract

We apply X-ray standing wave technique on multiple spectroscopic methods to characterize the structure of the periodic multilayers which are designed as reflecting mirrors for radiations of certain wavelengths. In this work, we have performed X-ray fluorescence spectroscopy (XRF), hard X-ray photoelectron spectroscopy (HAXPES) and particle induced X-ray emission (PIXE) in order to generate the X-ray standing waves (or Kossel diffraction in the case that the standing waves are due to the interference of the X-ray emission) within the nano scale periodic multilayers or so-called superlattices. The effect of the standing wave can be studied by observing the variation of the spectroscopic intensities as a function of the angle between the surface of the multilayer and the incident radiation/particle beam. Such angular dependence of the spectra provides a depth profile of both elemental and chemical information of the multilayers. The experimental results are compared with theoretical calculations. A fine fit of them indicates a great potential of these characterization methods, of which the PIXE-Kossel method is originally designed by our research groupe.

Keywords— *Interface, periodic multilayer, spectroscopy, X-ray standing waves*

Professional Biography

Meiyi Wu has obtained his bachelor degrees in physics and applications in 2012 from both Wuhan University and Université Claude Bernard Lyon 1. He obtained his master degree in sciences of materials and nano-objects in 2015 from Université Pierre et Marie Curie (Sorbonne Université today). He has been studying as PhD student in Laboratoire de Chimie Physique - Matière et Rayonnement of Sorbonne Université since 2015 and is expecting to obtain his PhD in 2018. During two years, he has published 4 papers in journals and 4 conference papers. He has contributed in multiple international conferences with posters and oral presentations, including an invited talk.



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