Synchrotron and Neutron Diffraction of Standard Reference Samples for Powder Diffraction Developed at IPEN-CNEN/SP

Martinez, L. G.[1], Galvão, A. S. A.[1], Mazzocchi, V. L.[1], Parente, C.B.R.[1], Corrêa, H. P. S.[2], and Orlando, M. T. D.[3]

[1] Instituto de Pesquisas Energéticas e Nucleares - São Paulo SP Brazil
[2] Universidade Federal do Mato Grosso do Sul - Campo Grande MS Brazil
[3] Universidade Federal do Espírito Santo - Vitória ES Brazil

The verification of alignment and calibration of powder diffractometers is generally performed by the measurement of standard samples. For neutron and synchrotron diffraction it is also necessary the precise determination of the energy or wavelength of the radiation, which is done by using reference samples. For powder diffraction line profile analysis, used for instance in determination of crystallite sizes and microstrains, it is imperative the determination of the instrumental breadth and this is also done by means of standard reference samples. These standard reference samples, besides other properties like crystal structure and cell parameters very well defined, must present high crystallite size and no microstrains in order to present diffraction peaks broadening due exclusively to the instrumental factors. For this purpose are generally used the NIST Standard Reference Materials for Powder Diffraction like Al_2O_3, Si, LaB_6 etc. In order to have an alternative source of standard reference materials for powder diffraction we are studying and developing some standard samples and comparing their diffraction properties to the NIST standards. In this work are presented some results of our $\alpha{-}Al_2O_3$, Y_2O_3 and Si standard samples measured by synchrotron powder diffraction (D10B-XPD and D12A-XRD1 - LNLS) and neutron powder diffraction (Neutron Powder Diffractometer - IPEN/CNEN). The measurements of our standard samples are compared to measurements of LaB_6, Al_2O_3 and Si NIST standards, measured at the same conditions. The results show that our standard samples fulfill the requirements to be used as powder diffraction standards and can be used in substitution to the NIST standards.

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