

(302-514) - Study of The Crystallinity of The Intermetallic Compound U₃Si₂, Used as Nuclear Fuel, by Synchrotron Radiation Diffraction

Ichikawa, R. U. (1); Martinez, L. G. (1); Silva, R. S. S. (2); Riella, H. G. (2); Carvalho, E.F.U. (1); Conturbia, G. (1); Garcia, R. H. L. (1); Imakuma, K. (1)
(1) IPEN; (2) UFSC

Uranium silicide (U₃Si₂) is an intermetallic used as nuclear fuel in most modern research reactors. This material is dispersed in aluminum, and allows it to achieve high densities of uranium in the nucleus of a fuel, up to 4.8 gU/cm³. For its use in a nuclear reactor, the U₃Si₂ is submitted to a strict quality control, which includes particle size, real density, crystallinity and chemical characterization. In order to obtain reference parameters, in this study samples of uranium silicide were analyzed with X-ray diffraction produced by synchrotron light. The diffraction profiles were analyzed by Williamson-Hall, Warren-Averbach and Rietveld methods. The data from crystal structure and crystallite size of the samples were refined, and reference values of these parameters were achieved allowing the qualification process of quality control of fuel production in Nuclear Fuel Center of IPEN.
