

RIETVELD REFINEMENTS OF U-NB ALLOYS

Eric J. Peterson, William L. Hults, David F. Teter, Donald W. Brown,
Jason C. Cooley, Ann M. Kelly, Larry B. Daulesberg and Dan J. Thoma
Materials Technology-Metallurgy
Los Alamos National Laboratory, Los Alamos, NM 87545

In studies of metal alloys it is often desirable to perform measurements on as-formed samples, commonly in the form of metallographically-prepared specimens. In the case of x-ray diffraction measurements performed on this type of sample, grain size can become an issue, with large grains introducing problems with preferred orientation and extinction. Additional complications are surface damage resulting from the metallographic preparation of the sample as well as fairly rapid surface oxidation upon exposure to air. This is exacerbated in the case of uranium alloys, due to the low (<1 micron) penetration of uranium by Cu k-alpha x-rays. Traditional methods of producing metal alloy powders that are better suited for x-ray diffraction, such as the production metal filings, introduce further uncertainty; for example, martensitic phase transformations may be induced by sample preparation. Neutron diffraction of as-prepared alloys has the advantage that by sampling the bulk volume of the as-formed sample, preferred orientation and surface effects are greatly reduced. In this study, the results of Rietveld refinements of x-ray data obtained from samples prepared by various means are compared to refinements performed on neutron diffraction data obtained from the same as-formed samples with the goal of developing a suitable x-ray diffraction sample preparation method for uranium alloys.

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Speaker: Eric J. Peterson
MSG770
Los Alamos National Laboratory
Los Alamos, NM 87545
Phone 505-665-3385
FAX 505-667-5268
Email ejpete@lanl.gov

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