Structural study of the ball-milled Cr$_{80}$Co$_{20}$ alloy by the Rietveld refinement of XRD profiles

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Abstract:

This work reports on the Rietveld refinement of X-ray diffraction profiles of a ball-milled Cr$_{80}$Co$_{20}$ mixture. Using the MAUD program, different fitted parameters such as lattice parameters, crystallite size, microstrains, dislocations density and phase fraction are studied as a function of milling time. The results show the formation of nanostructured bcc-Cr(Co) solid solution after 24h of milling. In addition, the obtained alloy contains a high density of defects.

Based on the deduced phase fraction from the Rietveld refinement of the XRD patterns, the Johnson-Mehl-Avrami model is used to study the formation kinetic of the nanostructured Cr$_{80}$Co$_{20}$ alloy.

**Keywords:** X-ray diffraction; Rietveld refinement; nanostructures; defects; kinetic.