

DOMAIN TEXTURE OF Cu₃Au FILMS IMAGED BY COHERENT X-RAY DIFFRACTION

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X-ray diffraction with a coherent beam will preserve the crystallographic phase of the entire object under illumination. The interference between domains in a textured material is encoded as intensity modulations in the diffraction pattern which can be recorded with a high-resolution detector. In principle, this can be inverted to an image of the texture. We have recorded such diffraction patterns using the (100) and (110) diffraction peaks of a crystalline thin film of Cu₃Au with (111) orientation. Undulator radiation of 8.5keV from the Advanced Photon Source was required for the coherence. The texture in this sample is due to antiphase domains which are around 1000Å in size. The diffraction patterns have been inverted using the Gerchberg-Saxton and hybrid-input-output algorithms to produce images of the domain texture. In this paper we will report our progress towards understanding the convergence of the algorithm and the uniqueness of the texture images we have obtained.

KEYWORDS: Phase determination; X-ray Imaging; Antiphase domains